FLIGHT

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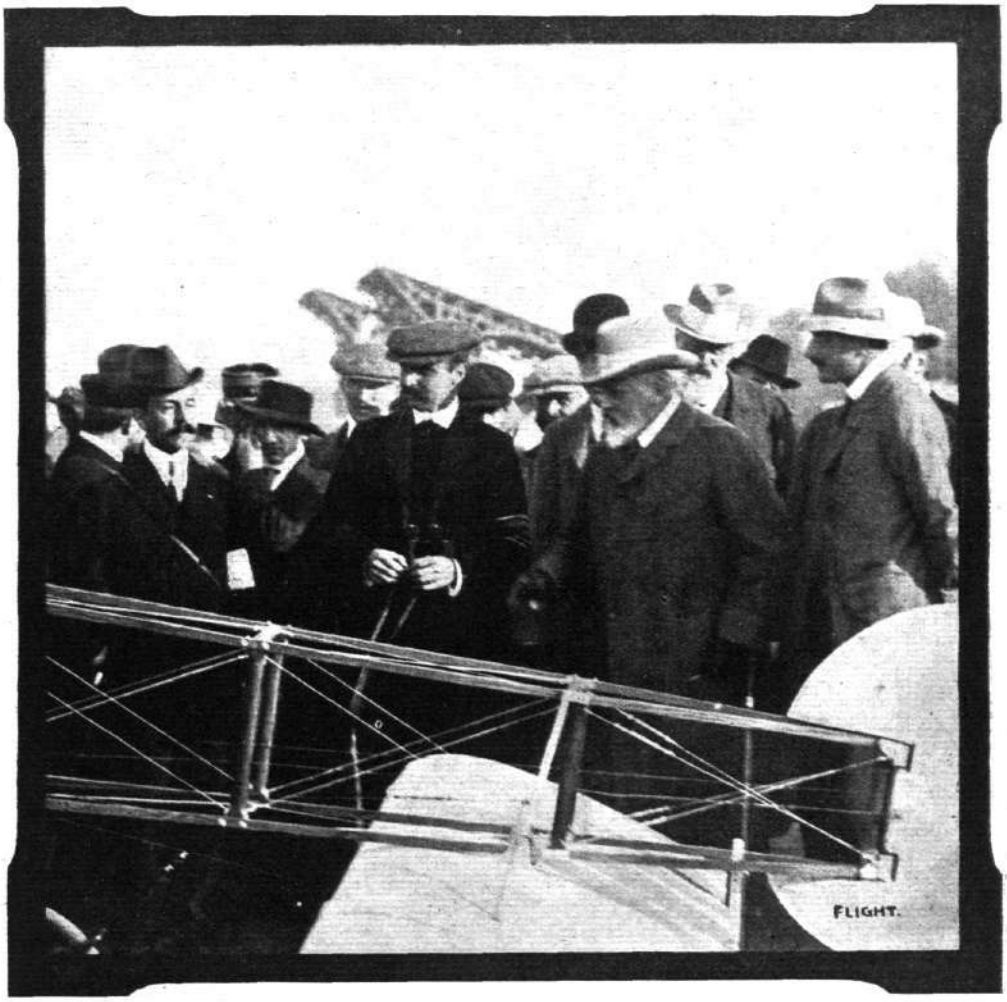
HIS LATE MAJESTY KING EDWARD VII.



A Typical Incident in the Career of the Monarch, Counsellor, Sage, and Sportsman, whose Death has cast a gloom over Five Continents.

OUR DEAD KING AND AVIATION.

WHILE every race and every class throughout this great Empire of ours sincerely mourns the loss of that great and good monarch, King Edward VII, aviation—though young as an actual industry—has sustained by his death a loss that is well-nigh incalculable. From the very infancy of the science, when the Wrights and Farman first demonstrated that flight with the heavier-than-air machine had at last come within the range of really practicable possibilities, King Edward showed the liveliest interest in the progress and development of the new movement, recognising very thoroughly the vast potentialities that lay in this latest triumph of man over the forces of nature. True, there is some melancholy satisfaction to be gained by those who are closely concerned with the future of man-flight that our beloved monarch lived long enough to have realised in all its potent actuality that the last element to resist the genius of man had at last yielded to his continued striving. To have lived to see this crowning triumph of man's intelligence is surely something. It is possible that, through close association with flight and its problems, the subject becomes somewhat of an obsession with its devotees, exercising a narrowing influence upon the personal outlook; and it may conceivably be the unconscious result of that induced state of mind which impels us to think that it would have been infinitely more sad if King Edward had been gathered to his fathers on the eve of the new era instead of when its sun was fairly risen in the heavens.

That King Edward took more than a passing interest in aviation and its possibilities has been most amply proved during the all too short time between its arrival as a practical science and his untimely death a short week since. At the very first available opportunity he satisfied himself personally that these were no travellers' tales which were told of men flying almost at will on machines heavier than the air which supported them; and his interest was not simply that of the highly-placed personage viewing a new thing with natural curiosity. Rather was his the interest engendered by keen, intelligent inquiry of the men who themselves had succeeded in surmounting the difficulties and dangers which for so many centuries stood between the human race and the conquest of the air. Divesting himself for the moment of the divinity that hedges kings, he became for the time being the inquiring man desirous of knowing at first hand all that was to be known regarding this new and wonderful development whose potentialities are so far-reaching and whose development may one day entirely change the whole conditions of civilised life and government on our planet.

Having satisfied himself that the problem of flight was indeed solved, and that its universal application to everyday purpose was merely a matter of time and patient development, King Edward, with that wonderful foresight and keen perception of the needs of the moment which were perhaps his chiefest characteristic, proceeded to throw the weight of his influence on to the side of the science, utilising every means that readily came to hand, as, for instance, when he set the seal of his august approval on the movement by causing the Aero Club of the United Kingdom to embody the prefix "Royal" in its title. We shall probably never know—nor is it at all necessary that we should know—precisely to what prompting this was due, but whether it came of the Sovereign's own volition or as the result of a suggestion tendered by others, the outstanding fact is that it came, like so many other of his gracious acts, at precisely the right moment, and in precisely the right way. It is a matter of almost ancient history now that the moment the new science became practical as a spectacle, there was a danger in this country that, in part owing to the ambitions of those who aspired to its control, and in part to the promoter who sees in everything of the kind a method for extracting money from the pockets of the people, its first development might be retarded and progress delayed many years through internecine warfare between those various bodies who would fain claim to be paramount in the councils of aviation. Just when it seemed that wasteful squabbling was inevitable, His late Majesty tactfully and gracefully settled matters out of hand by the simple expedient of creating, by the use of a single word, one national body supreme in all matters affecting the real control of the infant movement. It might perhaps be thought that we have a natural tendency to bias in this matter which impels us to write thus, but the occasion is far too solemn a one for us to set down anything but what we sincerely believe to be true. Contrast, by way of proof, the many years which elapsed between the introduction of practical automobilism into England and its final recognition as a Royal movement, and the similar recognition of flight; and then who will say that there was not a wise motive underlying this particular kingly action?

We have lost a King, a wise monarch, a statesman and diplomat, who was *facile princeps* among the crowned heads of the world, and one who also brought his statesmanship to bear upon the relatively small matters which go in detail to build up the larger issues of the affairs of nations; and one who by such manifestations of interest in the affairs of his people as we have endeavoured to outline had made himself the best-loved and most popular sovereign of his time. The aeronautical industry is fortunate in having burst into bud while King Edward VII was yet on the throne, for it has thereby obtained an admirable start, that will not readily be lost. Already the direct, as well as indirect, result of the late monarch's patronage of practical progress has led to official recognition throughout Great Britain, first of the importance of the automobile in the comity of nations as well as in the internal development of the Empire, and now of the necessity that is arising for the head of every British Government Department to foster the flight movement as an inevitable and highly desirable development of national and of international import. From that point of view his work was well-nigh finished, in the sense that it will last for all time to come. Already, for example, we see—as recorded on another page—representatives of the Admiralty, Army Council, Board of Trade, and Secretary of State for the Home Department about to attend a world's flight congress in Paris for the purpose of upholding British prestige, and also of smoothing the way for further progress in a manner that would be utterly and entirely in accord with the wishes and dictates of the late Ruler and Sage.

FLIGHT

TESTING PROPELLERS.

THE letter from Mr. J. A. Mays [470], which was published in our issue of the 23rd ult., raises a question of the greatest possible importance—the value of the static thrust test of a propeller. At the South-Western Polytechnic, in Chelsea, Mr. Mays has erected the testing plant of which he spoke in a letter that appeared in FLIGHT, November 27th, 1909, and of which the accompanying photograph is an illustration.

This plant consists of an electric motor, arranged to drive a propeller-shaft, on to the end of which a full-sized propeller can be fastened. The entire apparatus is mounted upon a substantial bed-plate that is slung from the roof by links, so that the thrust of the propeller tends to make the cradle as a whole swing out of the perpendicular. Actual movement on the part of the cradle is, however, restrained by its anchorage to a spring balance, and the spring balance itself is anchored to an adjustment screw, so that the cradle always hangs truly below its pivots, irrespective of the amount of thrust exercised by the propeller.

The vertical position is indicated by means of a pointer operating through a multiplying gear so arranged as to instantly show the least deviation from the vertical. When the propeller is in motion it is the operator's duty to turn the adjustment-screw until the pointer indicates that the cradle is hanging in a vertical position. When this state is shown to be stable by the steadiness of the pointer, the reading of the spring balance affords a direct measurement of the *static* thrust of the propeller.

Limitations of Static Thrust Tests.

Now we have often had occasion to point out that the static thrust test of a propeller is not representative of the conditions of flight, and therefore may be of little or no use as a direct indication of the suitability of a screw for the work it has to do on an aeroplane. No one realises these limitations better than Mr. J. A. Mays and those who are working with him, but it is their object to investigate the possibilities of this method of testing in order to find out whether or no it is capable of leading to some useful result. The relative convenience of a static thrust testing plant, as compared with a whirling table or other special device for representing actual flight conditions, is so obvious that no arguments are necessary to prove the importance of knowing with exactitude how far it can be of service. This is a work that can be carried out at the South-Western Polytechnic if manufacturers of propellers will support the enterprise by submitting their screws for test, and we imagine that those who are really interested in the matter will not be slow to avail themselves of the opportunity. It is quite impossible that conscientious research should be unproductive, even if its sole result consists in establishing once and for all the uselessness of the method employed.

The static thrust of a propeller, that is to say, the force with which it pushes against a stationary object, is only representative of one momentary condition under which it works on an aeroplane. This is the instant when the pilot is about to say "let go." From that time the machine itself is in motion and the propeller is screwing its way through the air at the speed of flight and is only setting in rearward motion a slip stream of such velocity as will afford the necessary thrust to overcome the resistance of flight.

This slip velocity will be, say, in the order of 30 per cent. of the "pitch speed," more or less. For example, suppose the product of pitch and revolutions of a propeller gave a pitch speed of 60 miles an hour, then a slip of 30 per cent. would mean that the propeller created a rearward slip stream in order to obtain the thrust necessary to drive the machine forward at 42 miles an hour.

Only a fraction of the full pitch, if we can imagine it in some way as a separate element, is employed to create the slip stream. The remainder of the pitch works its way through the air without contributing to the thrust; it represents, as it were, the neutral plane of the propeller, in respect to which that part of the pitch giving rise to the slip is a positive quantity.

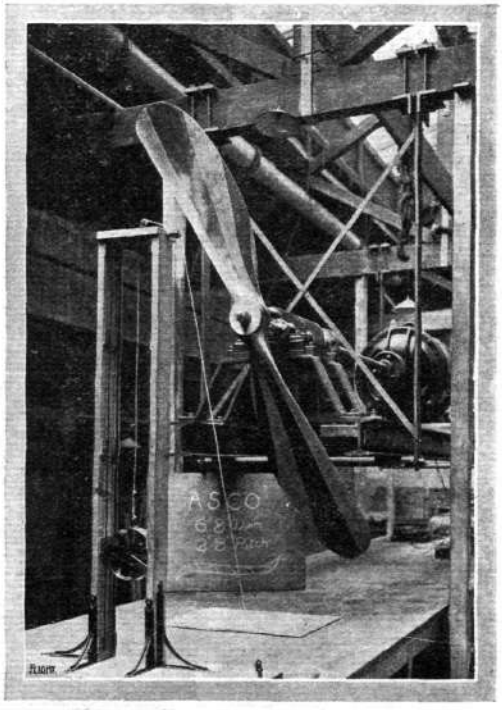
When the same propeller is rotated on a stationary machine—such, for instance, as the apparatus erected at the South-Western Polytechnic—the neutral plane of the propeller-path is a disc, not a helix, consequently the whole of the pitch, as represented by the angle of the blade, is a positive quantity in respect to the neutral plane, and the whole of its effect is represented in the slip stream. Instead of a slip of, say 30 per cent., the slip should be, theoretically, 100 per cent.; that is to say, the velocity of the air stream from the propeller should be equal to the measured pitch multiplied by the revolutions. Needless to say, the static thrust thus obtained would be much greater than the actual thrust in flight, but that is not the point about which misconception is so likely to arise as the relationship between that thrust and the power necessary to create it, in other words, the question of the "efficiency" of the propeller.

Propeller Efficiency.

There are three sorts of efficiency associated with the working of aerial screws. There is the efficiency of the propeller in flight, which is the ratio of the work done (as represented by the velocity of flight multiplied by the thrust required to sustain flight) to the power expended in the shaft; there is the efficiency of the aerial screw used as a fan, which is the ratio of the energy in the air stream (as represented by the mass-velocity of the fluid) to the power expended in the shaft; and there is the efficiency of the aerial screw used as a helicopter, which is the ratio of the lift to the power expended in the shaft. This last is, properly speaking, no sort of efficiency at all, because the numerator and denominator of the ratio are expressions of different degree. The thrust is a measurement expressed in pounds, and does not include the factor speed that enters into the expression of the power. Consequently there is no such thing as 100 per cent. efficiency in the case of static lift or thrust, and the only means of comparison is by reference to a value that for the time being has been established as the best.

In order to test the efficiency of a propeller in flight it is necessary to reproduce the conditions of flight in the test, either by keeping the propeller in bodily motion through the air or by feeding the propeller with a stream of air that is already in motion at the speed of flight. The first method is represented by the whirling table or by the rolling trolley that was employed in Germany some little while ago. Both methods involve an enormous amount of space and a very expensive equipment. Even a whirling table for testing models of propellers only a few inches in diameter needs a very large room; that at the National Physical Laboratory is 80 ft. by 80 ft. by 12 ft.

Vickers, Sons, and Maxim have erected a whirling table for testing full-size propellers. The problem of testing propellers in an artificial draught has not, so far as we are aware, been thoroughly investigated. It would obviously involve a large apparatus, although the space occupied should be considerably less than is required for the other system of testing.



The static thrust propeller testing plant, erected by Mr. J. A. Mays at the South-Western Polytechnic. This apparatus is now available for constructors, see FLIGHT, page 316, letter 470.

Comparisons of Blade Form by Test.

When we come to testing an aerial screw in still air it is very necessary to determine in the first instance what sort of information is available and in what way it should be interpreted. A propeller designed for use on an aeroplane in flight may or may not be a good fan, and is more than likely to prove an indifferent helicopter. It is a simple matter to show, mathematically, that the greatest thrust with the least horse-power is obtained from an aerial screw of infinitely large diameter and infinitely small pitch, conditions which do not satisfy those obtaining with the propeller in flight. If the results of a static thrust test of a propeller are expressed as they would be for a helicopter, that is to say, by the ratio of the thrust to the power expended in the shaft, the information is meaningless if taken by itself as an indication of the properties of the same propeller in flight. On the other hand, it is possible that two propellers of the same diameter and pitch but of different blade form might possibly be thus compared with some utility. We do not know if this is so, but we certainly think it is worth while trying to find out. Makers of propellers should, we think, consider it to their advantage and to the progress of their business to have the question settled one way or the other. The plant at the South-Western Polytechnic is available for their purpose, and it is in the hands of those who have the necessary scientific training to work accurately, and, that most desirable quality of investigators, an absence of preconceived ideas.

Static Thrust Test Data.

Among the data that can be determined by the static thrust test are the following :—

A propeller revolving in still air on a stationary machine sets in motion a slip stream that should have a velocity equivalent to the product of the pitch multiplied by the revolutions, but it is possible that a direct measurement of the velocity of the stream itself, by means of an anemometer or other suitable instrument, would disclose a discrepancy between the two values. An anemometer has, as a matter of fact, been erected on the apparatus under discussion for this very purpose.

Suppose, for example, that the measured velocity of the slip stream is less than the value represented by a pitch × revolutions. This would show that for some cause or other the blades were failing to obtain a proper grip of the air, and comparisons of different blade forms and different numbers of blades might quite possibly lead to very interesting and important information on this matter.

The "Slip."

While dealing with this particular point it may be as well to draw attention to the exact use of the term "slip," lest it be applied in an incorrect way to the above-mentioned difference that may exist between the measured velocity of the stream and the velocity represented by the pitch revolutions. "Slip" is a very natural term to apply to the above-mentioned phenomenon, but it does not have the same meaning in connection therewith as in connection with the propeller in flight, and we suggest that it should be differentiated by using the term "fan-slip" as a term of reference to the slip of a screw used as a fan. It will be observed that the slip-stream plus the fan-slip are necessarily numerically equal to the pitch-speed (pitch × revs.) in the case of a propeller used as a fan. In the case of a propeller in flight, the pitch-speed is represented by the speed of flight plus the slip-stream plus the fan-slip. Ordinarily it is assumed that the fan-slip is zero, and that the difference between the pitch-speed and the flight-speed accurately represents the slip-stream. If there is any fan-slip, however, the slip-stream will be less than the amount thus calculated by a quantity equal to the fan-slip, and since the thrust is proportionate to the effective slip, the thrust will have an actual value correspondingly less than the apparent figure as deduced when fan-slip is supposed to be zero.

Yet another factor that must be borne in mind is the effect of the wake that follows the machine in flight. If the propeller operates on this wake, which is a stream flowing in the direction of flight, the real slip stream will have a lower rearward velocity relative to still air than the apparent value indicated above, but the effective value for producing thrust will not be affected thereby.

Now it is very important that estimates of thrust and speed should be reasonably accurate, and it is essential to know whether fan-slip should or should not be considered as a factor. If the fan-slip is found to be considerable as the result of making a static thrust test, then we see no reason to suppose that it should be negligible in the case of a propeller in flight, although it does not necessarily follow that the actual values are the same in both cases. In this connection it occurs to us as being distinctly important to have a means of directly measuring the slip stream in whirling table tests, and we commend this thought to the National Physical Laboratory in the hope they will devise a method of obtaining such data. Working on these lines, and combining the results thus obtained with information collected from trials of full sized aeroplanes (especially the gliding angles of such machines), would be the means of establishing a reliable working basis for calculating the thrust of propellers, and it would incidentally throw a considerable amount of light on the limitations of the application to this subject of the Newtonian method (see "Flight Manual," Note I).

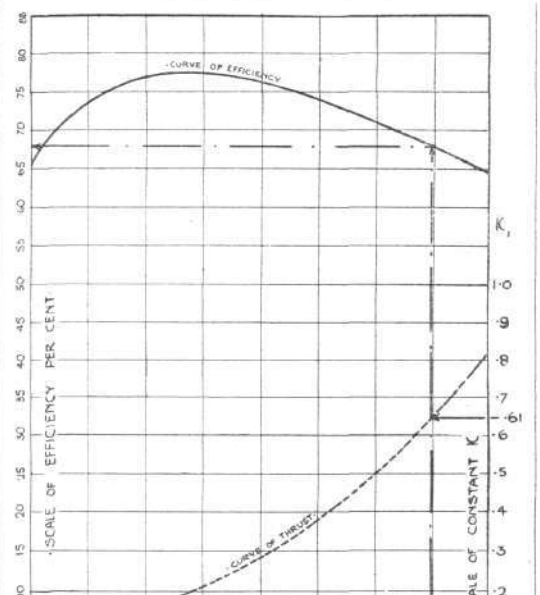


Chart for two-bladed propeller of stated blade form having a pitch ratio (pitch ÷ diameter) = 1·2

$\kappa = \frac{T}{V^2D^2}$; T = thrust (lbs.), V = flight speed ft./sec., D = propeller diameter.

Experimentally plotted from observations of thrust efficiency throughout a range of flight speeds that are expressed in terms of slip, the slip being expressed as a percentage of the pitch speed (pitch × revolutions).

Example showing the use of the chart: Thrust required, 80 lbs. at a speed of 41 m.p.h. (60 ft./sec.), with a propeller 6 ft. diameter (pitch ratio 1·2; p = 7·2 ft.).

$$\kappa = \frac{T}{V^2D^2} = \frac{80}{3600 \times 36}.$$

$$\kappa_1 = (\kappa \times 1{,}000) = \frac{80{,}000}{130{,}000} = \cdot 615.$$

From the chart (κ_1 = ·615) indicates that the above conditions of working will give a propeller efficiency of 68 per cent. The indicated slip being 34 per cent. of pn implies that the flight speed (V) = 56 per cent. of pn

$$\therefore 60 \text{ ft./sec.} = 56\ pn. \quad \therefore pn = \frac{60}{\cdot 56} = 107 \text{ ft./sec.};$$

and since p = 7·2 ft., $\therefore n = \frac{107}{7\cdot 2} = 14\cdot 9$ rev./sec. = 890 revs. per minute.

Coefficient of Area.

Another point that could be investigated in connection with the static thrust test of a propeller is whether the product of the measured slip and the disc area of the propeller correctly accounts for the measured thrust in accordance with the fundamental equation :—

$$T = mf = \frac{\rho}{g} A v^2$$

where T = thrust, m = mass, f = acceleration, ρ = density,

g = gravity, A = disc area of propeller, v = slip stream velocity. If there is any discrepancy it must obviously lie in the value given to the disc area, for the other values are all actual quantities. It is here assumed that there is no appreciable rise in the density of the

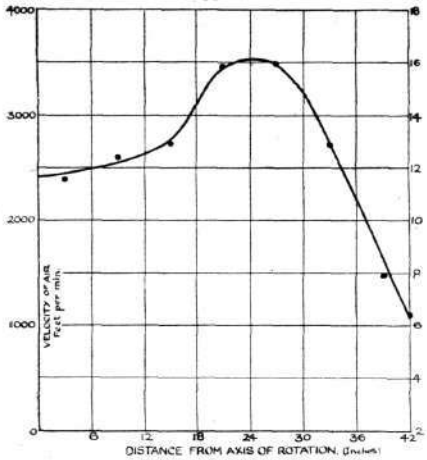


Chart showing results of a test on an Asco propeller, 6 ft. 8 ins. in diameter, pitch ratio 1·0, blade width (max.) 9¼ ins. The above curve indicates the velocity of the slip stream at different distances from the axis of rotation as measured by an anemometer distant 3 ft. from the plane of the propeller, while the propeller itself is developing 55 lbs. thrust at 495 r.p.m. The maximum measured velocity exceeds the stated pitch speed. Tests taken on J. A. May's apparatus at the South-Western Polytechnic, April 6th, 1910.

air as the result of compression, a fact that can be established one way or the other by a suitable investigation of the region in question.

It does not necessarily follow that the effective cross sectional area of the slip stream is equal to the disc area of the propeller, but it is very important to know the relationship between the two in connection with calculations. A direct measurement of the effective cross sectional area of the slip stream would probably be a difficult matter to accomplish, whereas it is quite possible that a series of static thrust tests might be the means of deducing a reasonably accurate coefficient of area that could be applied to all propellers of a certain type.

Such coefficients would be of immense value in bringing about the agreement between theory and practice that is so very desirable.

A Useful Formula.

Taking the case of the fundamental formula

$$T = mv = \frac{\rho}{g} A v^2 = \frac{\rho}{g} \frac{\pi}{4} D^2 v^2 = \frac{\rho}{g} \cdot \frac{\pi}{4} D^2 p^2 n^2$$

where T = thrust, m = mass, v = slip stream velocity, ρ = density, g = gravity, A = disc area, D = propeller diameter, p = propeller geometric pitch, n = propeller revolutions per sec.,
and introducing coefficients of disc area (c) and pitch (q) as follows :—

$$T = \frac{\rho}{g} \frac{\pi}{4} c^2 D^2 q^2 p^2 n^2$$

the basis of a practical formula is obtained for the calculation of the thrust of propellers that have not been tested.

Taking the case of a propeller in flight, we may express the slip stream v as a percentage (y) of the flight speed V (feet/sec.) thus :—

$$v = qpn = yV,$$

and, therefore, the above formula for thrust becomes

$$T = \frac{\rho}{g} \frac{\pi}{4} c^2 D^2 y^2 V^2$$

which may be simplified to

$$T = \kappa D^2 V^2,$$

where κ is a constant, including in one term the values

$$\left(\frac{\rho}{g} \frac{\pi}{4} c^2 y^2\right)$$

This form of the equation has many advantages. In the first place the thrust T, flight speed V, and diameter D, are always fundamental data in the design of any machine, which means to say that the required value of κ is known in advance for any machine for the above equation.

The Value of κ.

The problem of selecting a propeller thus resolves itself into finding the design that best satisfies the required value of κ, *i.e.*, has the highest efficiency when its κ is the stated amount. The second advantage of the above form of the equation is that in making a test of a propeller (on a whirling table or in an artificial draught) the values of T, D, and V are obtained as direct readings, and, therefore, also produce values of κ by direct calculation.

The results of such a test would naturally first of all be set down in the form of a chart having the curve of thrust plotted to the co-ordinates of V and κ, since for each value of V there is a value for κ that can be obtained by direct simultaneous measurement.

Bearing in mind, however, that the final results of the tests are required as a guide to the use of other propellers that have the same ratio of pitch to diameter but actually differ in size, it is obviously more convenient to express the flight speed V in terms of the pitch speed ($p.n.$) or better still in terms of the apparent slip expressed as a percentage of $p.n.$

Using such chart as a guide to which κ is the index, it is a simple calculation to arrive at the requisite revolutions for a given flight speed and propeller diameter, both of which must be initially assumed in the design of any machine.

If measurements of the torque on a propeller-shaft are made simultaneously with the other observations, a curve of efficiency in relation to thrust can be superimposed on the same chart, and thus the whole of the information required about a propeller is presented in a most convenient and intelligible form (see diagram). The constant, κ, serves as an index to the conditions under which a propeller of given diameter and pitch *must* work in order to produce the required thrust at the stated flight speed.

These conditions will differ for various forms of propeller, as shown by the difference between the curves obtained from different tests, but the index, κ, is unaffected thereby.

Any number of propeller charts may be obtained, but the same value of κ will be used as an index to each in order to ascertain which combines the qualities of highest efficiency and most convenient revolutions.

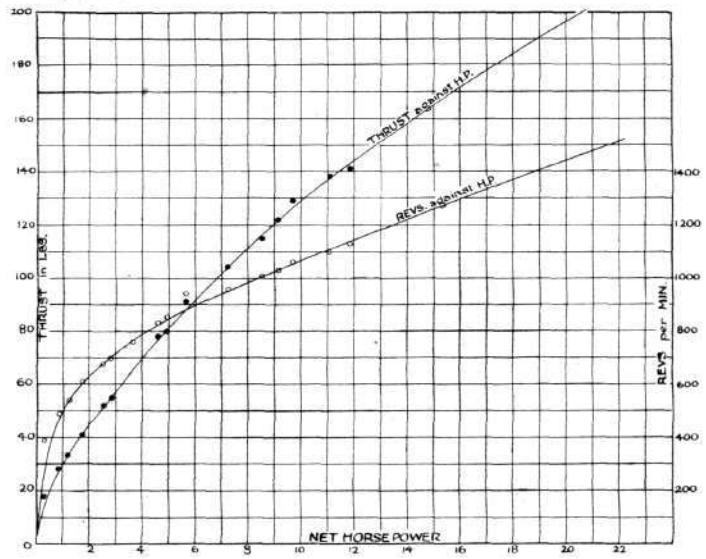


Chart showing results of a test on an Asco propeller, 6 ft. 8 ins. in diameter, pitch ratio ·4, blade width (max.) 10 ins. Tests taken on J. A. May's apparatus at the South-Western Polytechnic, April 18th, 1910.

In practice, since κ is such a very small number, it is convenient to work with values of $\kappa = (\kappa \times 1{,}000)$.

The advantage of having such a uniform basis as a common ground on which propellers could be compared and discussed the world over, is obvious; we hope the method described will meet

with the favour of manufacturers and be adopted in practice. Practical examples of the use of such curves appeared in "Naval Constructor's" article in FLIGHT, Vol. II, p. 124.

Now reverting to the main theme of the static thrust test of propellers, the question is, can values of κ be obtained by this means. It would seem to be impossible, for κ essentially co-relates thrust to flight speed, and that flight speed must be artificially introduced into the test, otherwise the relationship between thrust and revolutions (which is equally important) will be inexact.

On the other hand, the static thrust test offers an opportunity of investigating the practical values of the coefficients of disc area (c) and pitch (q) that is of great value, and the results of such tests should contribute largely to a proper understanding of the action of an aerial screw.

Some Static Thrust Charts.

The first tests carried out on Mr. May's plant were made on an Asco propeller, and the results are shown in the accompanying diagram and tables. It will be observed that the tests included measurements of the ratio of thrust to horse-power and revolutions to horse-power. An investigation of the velocity of the slip stream in different regions of its cross-section was also carried out, and an interesting curve has been plotted from the results. This indicates that the velocity is greatest in the region that is represented by an annulus situated 0·3 of the diameter of the propeller from the axis of rotation.

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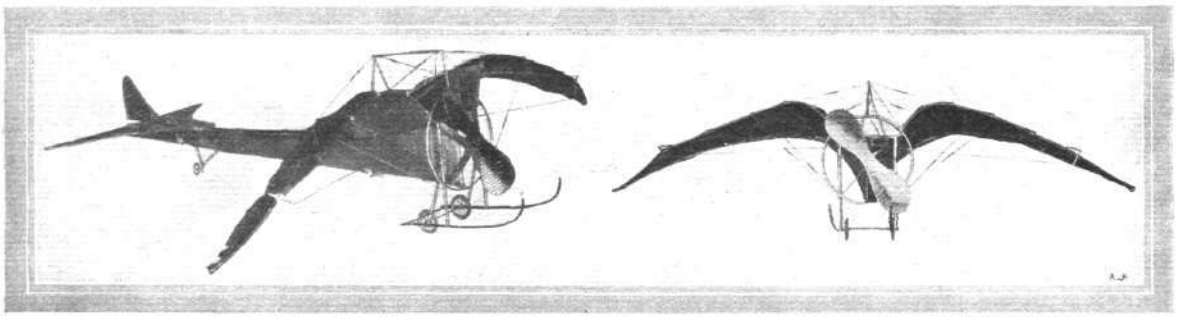
SIR CHARLES FORBES' MODEL MONOPLANE.



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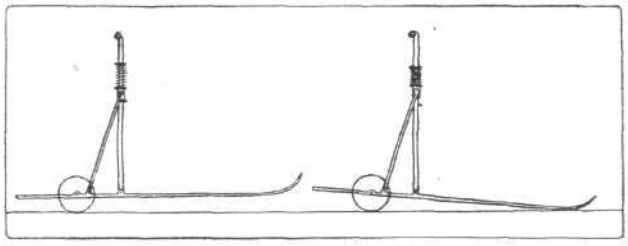
Two views of the model monoplane built by William Cochrane to the designs of Sir Charles Forbes, Bart. It will be noticed that the main planes are shaped rather like a bird's wing.

AN interesting and somewhat novel type of model monoplane, built by Mr. William Cochrane to the designs of Sir Charles Forbes, Bart., is depicted in the accompanying illustrations.

It is made of aluminium tubing and wood, the total length is 3 ft. 6 ins., and the span is about 3 ft. 4 ins., whilst the height is nearly 1 ft. The main planes are shaped somewhat like a bird's wing, but are very much arched. The tips of the planes can be warped by means of pedals, and the trailing edges of the main planes are slightly flexible. Hart's fabric is used for covering the planes, and the ribs are of ash bent to shape.

Most of the draught from the 10-inch Cochrane propeller is forced under the main planes, little going above them. A very neat landing chassis, with rubber tyred wheels and skids, is fitted, the action of which is shown in the accompanying diagram. The elevator-tail, which has ribs made of thin strips of box-wood, is carried on a sprung and pivoted rubber-tyred wheel. A hand-wheel on the right-hand side of the aviator's seat, which is just behind the trailing edge of the main planes, controls the rudder, and a lever on the left-hand side operates the elevator-tail.



Diagrams showing the action of the landing chassis for the model monoplane built by Mr. William Cochrane.

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A PROPOSED DESIGNING AND BUILDING CLUB FOR AMATEUR AIR-MEN IN LONDON.

MESSRS. J. D. NORTH and H. A. Myers, writing from 11, Westbourne Square, W., seek to enlist our sympathies on behalf of a club of a somewhat novel character that they are desirous of bringing into being in the Metropolis. Their idea, as they express it, is "to fill a long-felt want by bringing to a practical issue some of the many valuable inventions now in abeyance owing to lack of opportunity to test and patent them."

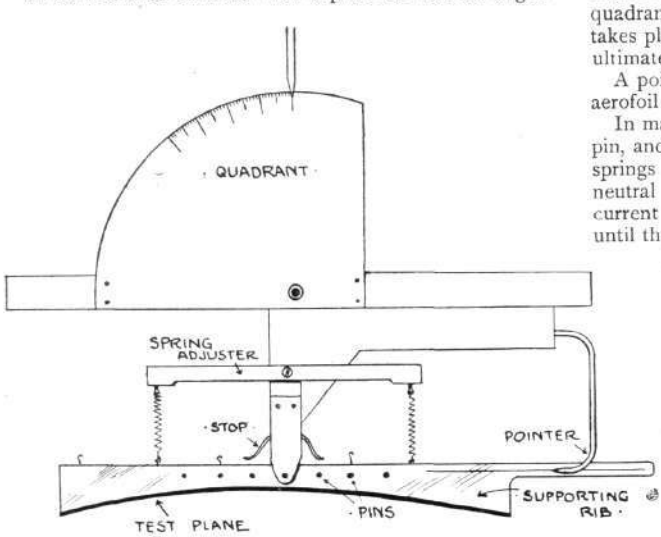
At the same time they submit to us the principal rules that they propose, though we regret that space prevents our setting them forth in detail. Suffice it to say that the general idea is for the club to establish a workshop of its own in London, that the funds of the club are to be used for equipping it, and for securing the use of a trial ground, that the actual work undertaken by the members will be determined by the committee appointed for the purpose, and that not only will the machines built be the property of the club, but that those machines will be entered by the club itself at any aviation meetings that may be selected. Possibly we may feel that the scheme savours somewhat of the Utopian, but for all that there is no real reason why it should not prove a success; and at any rate it has our very best wishes. Those desirous of further particulars should communicate with the gentlemen referred to above, at the address that we have mentioned.

FLIGHT

CENTRE OF PRESSURE ON ARCHED SURFACES.*

By MATTHEW B. SELLERS.

THESE experiments to determine the centre of pressure on some arched surfaces when exposed at various angles to a current of air, were made in November, 1906, but have not heretofore been made public.



Sketch illustrating the apparatus used by Mr. Sellers in his experiments.

At first a device similar to that employed by Prof. Langley was tried, but it was impossible to get correct reading owing to oscillation of the surfaces tested, and the proximity of even a slender rod used in an attempt to steady them vitiated the results. I therefore made the device shown in the sketch, which may be briefly described as follows :—

Attached to the surface to be tested, which I shall call an aerofoil, is a rib extending centrally fore and aft. On this rib pins are suitably located for pivoting the aerofoil.

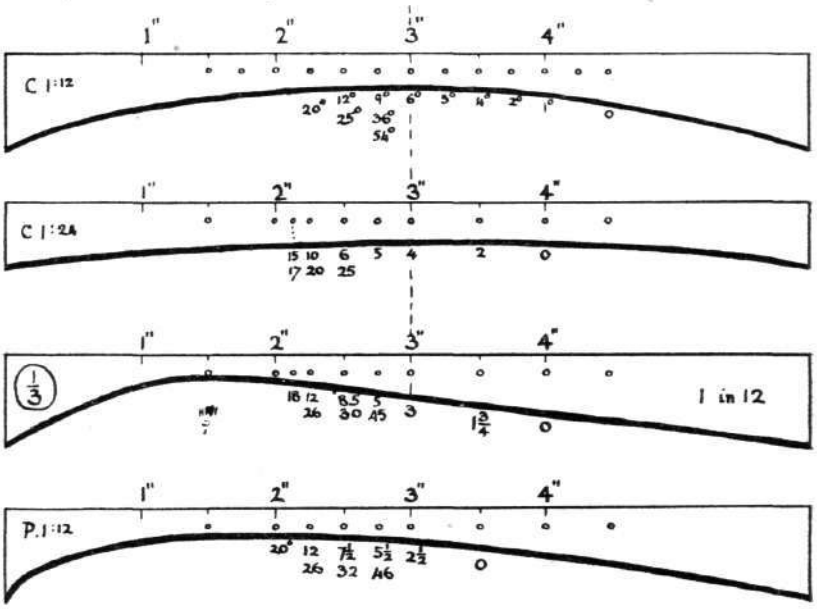
A support carries bearings, which may be sprung over the desired pin, and this support can be tipped in a vertical plane to any desired degree. A graduated quadrant indicates the amount of the inclination thus obtained.

The aerofoil is held in a position of equilibrium by adjustable springs, and these springs are set in the first instance to correspond with the zero position of the quadrant. Any movement of the aerofoil upon its pivots takes place against the action of these springs, and is ultimately limited by a suitable stop.

A pointer fixed to the framework indicates when the aerofoil departs from its neutral position of equilibrium.

In making a test the aerofoil is pivoted on any desired pin, and the quadrant is set to any desired angle. The springs are adjusted so as to bring the aerofoil into its neutral position as indicated by the pointer. The air current is then turned on, and the quadrant is adjusted until the pointer shows no deviation of the aerofoil from its neutral position. The reading on the quadrant corresponding to the neutral position of the pointer indicates the angle of inclination at which the aerofoil under test has a centre of pressure corresponding to the position of the pin upon which it is pivoted.

The aerofoils shown in Fig. 2 are 6 in. by 12 ins. Two have the curvature of a circular arc and a versine of $\frac{1}{2}$ in. and $\frac{1}{4}$ in. respectively. That aerofoil which is marked (1/3) is curved for the front third and flat for the rest of its width. The camber is one-twelfth of the chord. The aerofoil marked P is the half vertex of a parabola and also has a camber of one-twelfth



Sketches illustrating the planes with which Mr. Sellers experimented. The black lines represent the sections of the planes. Each plane is shown with the longitudinal rib upon which it was pivoted.

the chord. In this figure the pins used are shown by dots, and below each pin is shown the degree of inclination required to bring the centre of pressure to that point. The distance in inches from the front of the aerofoil is laid off on a scale.

* Paper read before the American Association for the Advancement of Science.

The changes in position of the centre of pressure are graphically illustrated in an accompanying diagram, where the line AX represents the length of the aerofoil and the abscissæ of the curves show the distances in per cent. from the front of the aerofoil. The ordinates show the corresponding degree of inclination.

The data represented by the diagram are also contained in the accompanying table. It will be seen from the curves that centre of pressure corresponding to zero angle of incidence is about two-thirds of the chord from the leading edge. It will further be noticed that the position of the centre of pressure moves forward with an increase in the angle of incidence, till it reaches a point one-third of the chord from the leading edge. This position is obtained with an angle of incidence of from 16° to 20°. From this point the centre of pressure begins to move slowly backward and is near the centre of the chord at an angle of incidence of 45°.

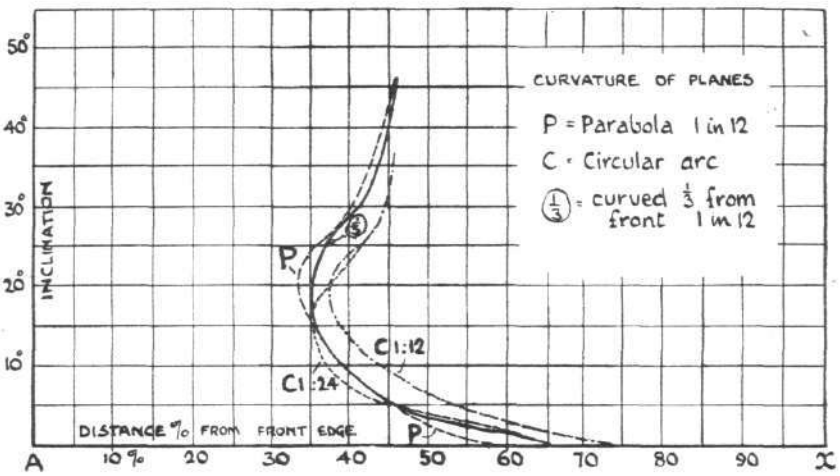


Diagram illustrating the shifting of the centre of pressure as deduced from the results of Mr. Sellers' experiments.

This movement of the centre of pressure is least in a parabolic curve and greatest in a circular arc. If we decrease the camber, the centre of pressure for all angles moves forward, and the angle at which reversal takes place is also lessened. It has also been found that changing the relative dimensions of an aerofoil, changes the relation of the angle of inclination to the centre of pressure.

It has been stated repeatedly that, for the same angle, the centre of pressure moves forward with an increase in air velocity; this may be so, but I have no positive proof of it and see no reason why it should be so. The air velocity used was 1,400 feet per minute.

Centre of Pressure.

Angles	Distance from front edge. C 1 in 12	C 1 in 24	Nearest per cent. 1/3 1 in 12	P 1 in 12	Angles	Distance from front edge. C 1 in 12	C 1 in 24	Nearest per cent. 1/3 1 in 12	P 1 in 12
0	75	67	67	59	8	47	39	42	42
1	68	62	62	55	9	46	38	41	41
2	63	58	57	51	10	44	37	40	40
3	60	54	52	49	15	39	35	36	35
4	57	50	48	47	20	38	38	36	33
5	54	46	46	46	25	42	42	37	36
6	51	42	44	44	30	45	45	41	40
7	49	40	43	43	40	46	46	45	44

EDITORIAL NOTE ON MR. SELLERS' EXPERIMENTS.

THERE are two entirely separate reasons for regarding the above paper by Matthew B. Sellers as a contribution of great interest and importance. In the first place it describes an apparatus that commends itself to us as a simple and straightforward method of obtaining the desired result with a fairly high degree of accuracy.

It will be observed that the important feature of the apparatus lies in the use of springs for holding the aerofoil in a position of equilibrium upon its pivot. It will further be observed that the method of obtaining a reading is to adjust the apparatus to a position of equilibrium of the aerofoil; a principle of working that has been adopted as the basis of many of the most accurate instruments known to science. It is very easy for an observer to say whether or no a pointer coincides with a mark, and it is equally obvious that when, in the apparatus in question, the pointer does coincide with the mark, that the centre of pressure on the aerofoil must be very close indeed to the pivot. It is of course true that the springs only completely neutralise one another in one position, and that any shifting of the centre of pressure can only make itself observed by a stretching of one spring or the other. If the stretch of the springs was used as a means of measuring the movement of the c.p. there would no doubt be room for considerable inaccuracy, but in Mr. Sellers' apparatus they play no part in the actual reading at all, *their action being entirely confined to a condition in which they are, or at any rate could be made, extremely sensitive.*

The second consideration that makes Mr. Sellers' paper a contribution of extreme interest and importance is the nature of the results obtained. These are of a somewhat startling character, inasmuch as the data that he has collected go to show that the reversal of the centre of pressure occurs when the angle of incidence *of the chord to the real wind is as great as 20°. It has always* been known that this reversal of the centre of pressure takes place in cambered aeroplanes, but there has been no reliable data on the subject, and it has, we believe, been tacitly assumed by most people that the phenomenon occurs at a much smaller angle than is indicated by the Sellers figures.

Wilbur Wright has referred to the subject as follows ("Flight Manual," Note 22):—"In deeply curved surfaces the centre of pressure at 90 degrees is near the centre of the surface, but moves forward as the angle becomes less till a certain point is reached varying with the depth of the curvature. After this point is passed the centre of pressure, instead of continuing to move forward with the decreasing angle, turns and moves rapidly towards the rear. These phenomena are due to the fact that at small angles the wind strikes the forward part of the surface on the upper side instead of the lower, and thus this part altogether ceases to lift, instead of being the most effective part of all as in the case of the plane."

It will be observed that the results of the Sellers experiments show the same rapidity of retrogression on the part of the centre of pressure after the reversal has once taken place. We are regarding these results in the reverse sequence to that in which Mr. Sellers deals with them. Mr. Sellers starts with a horizontal chord and speaks of the centre of pressure advancing as the angle increases, whereas the more common terms of reference hitherto have been to start with a vertical chord and to speak of the centre of pressure advancing as the angle of inclination decreases.

The value of the critical angle, which is given by Mr. Sellers as lying between 16° and 20°, is of immense importance to aviators, because it is perfectly obvious that this shifting of the centre of pressure might quite well be of a character to destroy the equilibrium of an aeroplane in flight. The fact that the critical angle has a high value according to the Sellers experiments (the normal angle of incidence in flight is much below 20° in all modern machines) is of course also of great importance, but it must be borne in mind that the position of the centre of pressure is not alone affected by a change of attitude on the part of the machine; it is, in fact, much more likely to be brought about by a change of direction on the

part of the wind. An aviator flying above open flat country may be progressing through a horizontal wind, but on passing over some high natural obstruction he may suddenly encounter a wind with such an upward trend as would change the virtual angle of incidence by several degrees. Quite possibly it might bring the virtual angle into the neighbourhood of the critical value. It is, of course, a matter for the designer to guard against as far as possible, and we do not suppose that the actual travel of the centre of pressure on aeroplanes that have a high aspect ratio and, consequently, a short chord, is likely to be an amount that cannot be neutralised in advance. Where we do foresee that it may involve difficulties and possible danger, however, is in the case of experimenters who are seeking to attain a high degree of natural stability in aeroplanes without the use of supplementary surfaces in the form of tails. Natural stability essentially implies permanent coincidence between the centre of pressure and centre of gravity. The centre of gravity is totally unaffected, of course, by the position of the centre of pressure, and directly any shifting of the latter point takes place a couple is produced tending to destroy equilibrium.

We have said enough to show the importance of this question, but we wish in conclusion to express the hope that the subject will be taken up in this country, and we should very much like to see the Sellers experiments checked at the National Physical Laboratory without further delay. It is to the interest of everyone that such fundamental information as this should be established by reliable authority at the earliest possible stage. The National Physical Laboratory has contributed, as the result of the air pressure experiments made by Dr. Stanton, quite a considerable amount of most valuable information on the subject of flat planes. The flat plane and the cambered aerofoil, however, are two essentially different things, and the sooner the very closest research on the subject of cambered aerofoils is undertaken the more quickly will progress be made along scientific lines. We suggest that the data of Mr. Sellers would make an admirable starting point.

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WEIRD EXPERIENCES IN SUNNY SPAIN.

IN our issue of the 30th ult., we referred to the action of the disappointed crowd at Durango, near Bilbao, which, because the aviators did not fly when they were expected to, turned round, stoned the aviators, and burned their machines. A most interesting account of these experiences is furnished in the following letter received from Mr. Launcelot D. L. Gibbs, whose Farman machine was burnt, from which it will be gathered that "Sunny Spain" is anything but a happy hunting ground for flyers. Mr. Gibbs writes:—

"Exciting times these for aviators, especially in Spain.

"On April 20th I signed a contract in Paris to fly at Durango, in Spain, on April 24th, 25th, and 26th. I warned those responsible that it would be well-nigh impossible to fly on the 24th unless the machine was delivered at Durango before midday the 23rd at the aviation ground, and then I did not think that I should be able to fly before 6.30 p.m.

"To this they said, 'Doesn't matter, you will try your best to be ready.'

"At 11.30 p.m. on the 23rd, my machine, by means of special trains, &c., arrived, and at 3.30 a.m. on the following morning, before daylight, I went with my mechanics to put it together, and worked solidly all the morning and afternoon. During this time the people had been collecting, and towards 3 o'clock in the afternoon the crowd had become some 30,000 strong.

"At 4 p.m. the crowd became impatient, at 4.30 p.m. the crowd became more impatient; at 5 p.m. their impatience became so great that I was asked to bring the machine out of the shed to allow the crowd to see it, and to see the work being carried on.

"Directly we wheeled it out the spectators pressed round it, sat on it, leant on it, and treated it so callously that I thought it advisable to return it to the shed in order to continue the work in peace before any damage was done, owing to ignorance on the part of the sightseers.

"I took the opportunity of returning it to its shed while a Blériot was brought out.

"The Blériot ran along the ground but did not rise, owing to its elevator being broken (that's what we were told).

"Upon the return of the Blériot the crowd began to throw stones, and at this juncture the mounted Guarda Civil charged with drawn swords.

"Five minutes later, however, they returned more ferociously, hurling stones, &c., so that it was impossible to carry on any further work. My mechanic was disabled. Being unable to speak Spanish is a great drawback while the shed was being torn down. I tried to explain that we wanted a few more minutes to adjust the magneto.

"At one point in the shed they tore a large opening with a knife, through which came a volley of stones. I went up to the opening smiling, and trying to explain about the magneto. I was met by a dozen wild individuals with a long pole pointed, with which they were going to ram. I smiled, or rather forced a smile, and talked fast in French, whereupon one of them—in bad French—whipped out his knife, and said they were going to knife me, as flying was impossible, there being no such thing as aviation, and they cried, 'Down with science, long live religion!' Whereupon I opened my coat, and pointed to where my heart ought to be, and said, 'Fire away, to avenge the motor,' still forcing a smile. Thank God, it struck him (the spokesman) in a humorous light, and he sheathed his knife, and babbled words to the effect that motors were bad things, and that he was sorry he could not hurt the motor. At this juncture I was advised to leave, under escort, with the rest, as the authorities said they would not be responsible for our lives if we stayed any longer, and possibly it might save the plane from being wrecked.

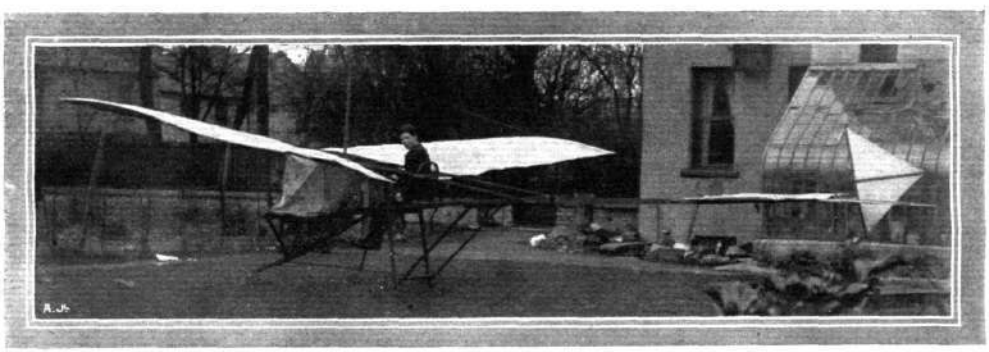
"This I thought was good advice, and went under escort back to the judge's house, being stoned and struck the whole way back. I was promised that the plane would be perfectly safe under protection of the Civil Guard. Half an hour later I was informed that everything had been burnt, lock, stock, and barrel.

"Of course, now people are sorry, but you might warn aviators *re* Spain and the Spanish crowd. Burning is a very common affair here apparently.

"Another half-hour and all would have been well; however, it was not to be.

"I have ordered a new plane, and shall be ready to fly in three weeks. At present I am staying here in order to see money refunded, and to institute proceedings if necessary.

"Exciting times for the moment I can assure you, and I have since blessed the solid nature of the British public."

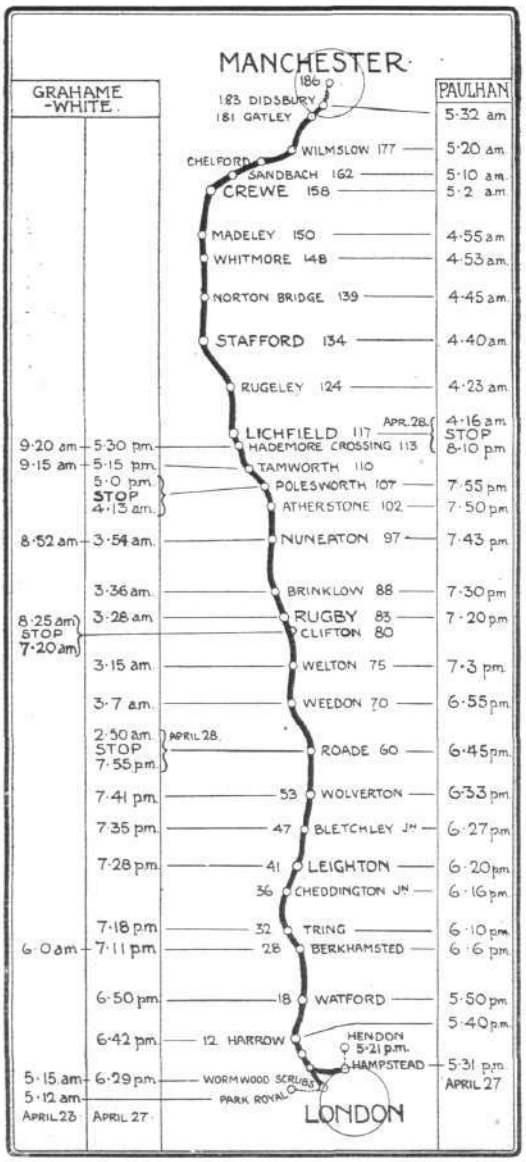


A Monoplane, built by Master Dhoual Cameron, aged 16, of Castlewood College, Rathmines, Dublin.—He was born deaf, and has been educated on the pure oral system under Mr. Newburn, having been successful in passing several competitive examinations. He enters for Trinity College next year, and is building two models for the exhibition at Ballsbridge in June.

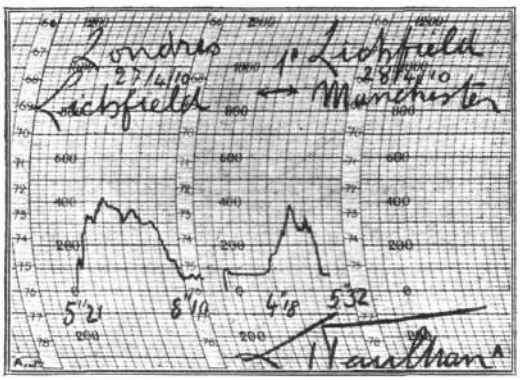
LONDON-MANCHESTER £10,000 FLIGHT.

M. Deutsch Entertains Paulhan.

A MERRY little party assembled on Thursday of last week in M. Deutsch de la Meurthe's airship garage at Sartrouville, when a luncheon was given by the great patron of the French pastime to his one-time mechanician. The airship dock was decorated, and a table was arranged along one side of the immense shed. In addition to M. and Mme. Paulhan, the guests included Count de la Vaulx and M. Surcouf, the Mayor of Sartrouville, and many prominent people in the aviation world.



LONDON—MANCHESTER FLIGHT.—Last week, at the time of making-up for press, a serious draughtsman's error was discovered on the special block which we had prepared giving the approximate times for the Manchester flight, which for accuracy's sake necessitated the re-making of the block, too late for that issue. We now publish the correct diagram, as above, as a matter of historical record, giving times for Mr. Claude Grahame-White's two flights and also for M. Paulhan's successful flight, the starting and finishing figures being official. Paulhan's actual recorded time of arrival was 5h. 32m. 16s.



Altitude chart of Paulhan's flight from London to Manchester, reproduced from the "Daily Mail."

The Lay Press and Aviation.

IN the early days of motoring, writers in the lay press often made shocking "howlers" when they attempted to tackle technical points, but it would have been thought that the present familiarity with motors would have prevented anything like the following "gem." This was indulged in by the scribe on a southern contemporary, who had to deal with Paulhan's flight to Manchester. It purports to describe what took place at the restart from Lichfield. Says the writer:—"The *necessary heat* was engendered to work the propeller, and when it began to work the machine was *pushed* from one end of the field to the other, and then rose in the air."

NOTICE TO INVENTORS.

AN official note from the Aeronautical Society of Great Britain intimates that the council are prepared to examine proposals from inventors with regard to aeronautics. In sending in proposals of the kind, inventors should clearly understand that the society undertakes no responsibility whatever in connection with them, and it must also be understood that they are only considered on the express condition that no report or communication emanating from the Aeronautical Society in reply thereto should be used for the purpose of advertisement or publication without the written consent of the council. Any proposals should be addressed in the first instance to the council, who will submit them to committees nominated by them for the purpose.

Inventions will be considered in the order in which they are received, and all communications will be regarded as strictly confidential.

No fee or charge of any kind will be made. Copies of documents only should be sent, and not originals.

With regard to models, the council will not hold themselves responsible for any damage sustained by them.

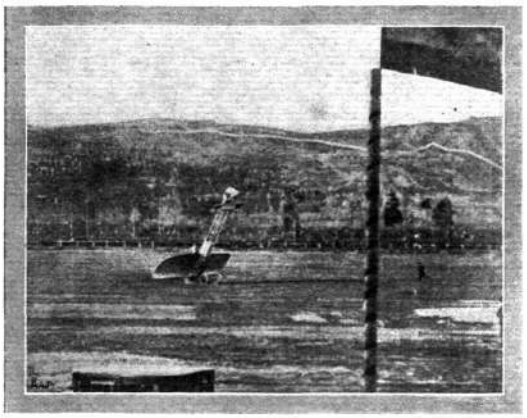
Inventors are reminded that the funds of the society are not available for the financing or developing of individual inventions.

The "Neale VI" Monoplane.

WITH reference to the photograph of the new monoplane with which Mr. J. V. Neale is experimenting at Brooklands, which appeared in our issue of last week, we have since received some particulars and dimensions which we now publish. The span of the main planes is 30 ft., and the method of control is by ailerons set in the rigid wings. The weight supported on the front wings amounts to 3·2 lbs. per sq. ft., while on the back surfaces the weight carried is 1·9 lbs. per sq. ft. The propeller, of 7 ft. 8 ins. diameter and 6 ft. 2 ins. pitch, is driven at a speed of 620 revs. through a reduction gear, which is self-contained with the engine. Including aviator, petrol, &c., the machine in running order weighs 530 lbs., and its lifting speed is 32 miles per hour.

FLIGHT

CONTINENTAL AVIATION MEETINGS.



Unique instantaneous photograph of an accident to Mamet on his monoplane during his exhibition flights in Spain.

The Tours Meeting.

LAST week we gave details concerning the opening days of the flying meeting at Tours which came to an end last Thursday. On the last two or three days squalls of wind and rain considerably interfered with the flying, but several good flights were made, and at the end Capt. Bertram Dickson led handsomely, he having during the week flown 266·96 kiloms. on his Henry Farman machine. His nearest opponent was Chavez with 147·18 kiloms. to his credit. One of the best trips was that made by the latter on the 3rd inst., when he flew for 2 hrs. 5 mins., covering 108 kiloms, and later in the day he rose to a height of 200 metres during a short trip. Capt. Dickson flew for 90 kiloms., and Molon for 36 kiloms., while Metrot (Voisin), Kuller (Antoinette), and Duray (Farman) also made short flights. The last mentioned won the speed prize by covering the 4 kiloms. course in 3 mins. 40 secs. Metrot, in landing from a flight in Mme. de la Roche's machine, damaged one of the wings. On Wednesday a violent tempest raged over the aerodrome, and the only flyer to venture out was Kuller, who fought his way through the elements for three kiloms. Thursday, the last day, was also very windy, and heavy showers of rain complicated matters. Chavez attempted to win the altitude prize, for which a minimum of 100 metres was set, but he only got up as far as 50 metres when he decided to give up. Later in the day Capt. Dickson went up, but was capsized during a turn, his machine being smashed, although he fortunately escaped unhurt. Mme. de la Roche also made a short flight, but in landing the tail of her machine was considerably damaged.

Lyons Meeting.

SOME extraordinary flying was seen at Lyons on Saturday last, the opening day of the flying week, both Legagneux and Van den Born striving for first honours. Van den Born, on his Henry Farman machine, opened the proceedings at two o'clock, and he was followed a few minutes later by Legagneux on a Sommer biplane. With the exception of sundry stops to replenish their fuel tanks, these two flyers were in the air the whole afternoon, their cumulative times being 4 hrs. 4 mins. and 3 hrs. 2 mins. respectively. As regards duration the best flight was by Van den Born, who flew 2 hrs. 6 mins. at a stretch, while Legagneux's longest trip was of 2 hrs. 1 min. The other flyers out during the day were Latham (Antoinette) and Metrot (Voisin), who each flew for about a quarter of an hour. At midday on Sunday, Lyons was swept by a violent storm, but in spite of this the day's record was a splendid one. Three new flyers were in the air, including Paulhan, Chavez, and Molon, and so the crowd had plenty to entertain them. Naturally, most of the flying was of short duration, but Legagneux flew 75 kiloms. in 1 hr. 28 mins., while Van den Born covered 45 kiloms. in 50 mins. and Chavez 41 kiloms. in 49 mins. In the competition for the speed prize over a 20 kiloms. course, Latham was first in 18 mins. 29 secs., with Legagneux second in 22 mins. 5 secs. The latter made the best attempt in the passenger contest by flying 10·648 kiloms. in 23 secs. When the storm came on Latham was actually in the air, and had an exciting experience in making a landing. This he effected successfully, although his machine was damaged sufficiently to put it out of the running on the following day. Only the biplanes ventured out on Monday, when Paulhan had it all his own way in the height competition. He attained an altitude of 640 metres, the only other one who flew at all high being Chavez, he reaching 118 metres only. Paulhan also was best in the speed contest, his time being 10 mins. 17 secs. In the passenger competition he carried a friend for 20 kiloms., while Legagneux flew with a companion for 14 kiloms. The latter made the longest flight of the day, the duration being 1 hr. 15 mins. At the end of one of his flights Legagneux landed rather suddenly, owing to the fact that Paulhan passed over him too closely. For this the London to Manchester victor was fined 20 francs on the following day, and on a refusal to pay, the fine was increased to 100 francs, and paid when disqualification was threatened. On Tuesday no flying was possible before dusk, when Chavez, Van den Born, Legagneux, and Metrot made short flights, and Paulhan took up M. Seguin, the constructor of the Gnome motor, as a passenger.

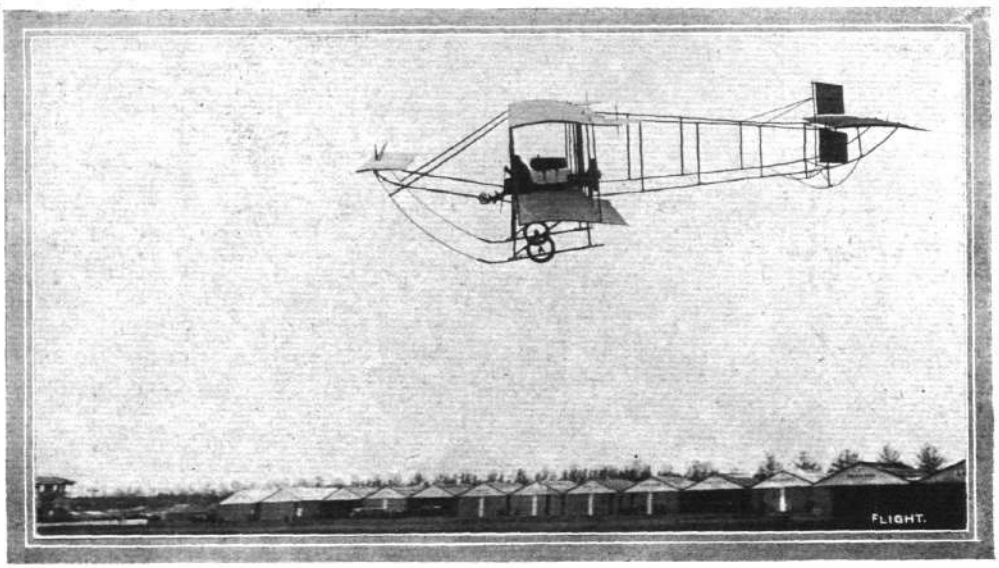
The Barcelona Meeting.

As Mr. Grahame-White found it impossible to get to Barcelona, the meeting last week was entirely confined to Blériot machines, and the most successful of the operators was Olieslaegers, whose best flights, mainly over the sea, were 41 mins. on the 3rd, 28 mins. on the 4th, 23 mins. on the 6th, 47 mins. on the 7th. On the last day, Sunday, the wind practically prevented any flying, but Olieslaegers determined to see what he could do. He rose in the air, but his machine capsized when turning, and falling to the ground was completely wrecked, although the aviator escaped uninjured. The other aviators were Barrier, Simon, and De Lesseps, all of whom made many short flights up to ten minutes in duration. Several times De Lesseps and Olieslaegers rose to a good height, notably on the 7th inst., when the former, in an eight-minute trip, reached 300 metres, while on the previous day Olieslaegers was up to 200 metres.

The St. Petersburg Meeting.

As a sort of preliminary to the week's flying meeting, arrangements had been made for a series of exhibition flights by Mr. H. Latham on Wednesday of last week. A huge crowd assembled at the Hippodrome to watch the proceedings, but they were doomed to disappointment. After making three ineffectual attempts to rise he at last got into the air, but only for about a minute, and then,

Mamet being congratulated at Madrid by Queen Victoria, after his fine flights at the Ciudad Lineal aerodrome.



Legagneux in full flight on his Sommer biplane at the Lyons Aviation Meeting.

in turning, one of the wings of his Antoinette machine caught on a sand mound. This caused it to double up, and brought the machine down with a crash, rendering further flying out of the question.

The actual flying week commenced on Sunday last, but the wind and the rain was against the flyers. Nevertheless, Christiaens and Edmond on Farman machines, and Morane on a Blériot, made several short trips, while Popoff on his Wright flew for 25 minutes. The greatest height was attained by Morane, who rose to 120 metres and then planed down. On Monday the wind practically precluded any flying, and the longest flight was one of just under ten minutes by Christiaens, he and Morane being the only flyers who ventured out. In addition to the four aviators mentioned, Wieneziers and his Antoinette, and Madame de la Roche and her Voisin are entered.

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THE INTERNATIONAL CONFERENCE ON AERIAL NAVIGATION.

BELOW we give the names of the British delegates who will next week attend the conference to be held between the representatives of the European Governments to discuss the making of laws to govern the use of the air for navigation purposes. There is no need to discuss the composition of the conference—that is entirely beside the point—and in any case we do not suppose for a moment that the immediate results of the conference will go much beyond the purely academic. Its chief significance lies in the implication that aviation has so far become an accomplished practicality, that the Governments of the world have awakened to the fact that a set of conditions has arisen which was never contemplated by the draftsmen who have from time to time prepared the code, written and unwritten, which constitutes what is vaguely known as international law. It has been said that the law relating to the air is in a state of chaos. That is an entirely false description, because what does not exist at all cannot be said to be in chaos. As a matter of plain fact, there is no law of the air applied in any civilised country, simply because until now there has never been any necessity to legislate in that direction, and it is this starting with a clean slate which gives so much interest to the discussions of the conference which will meet in Paris next Wednesday.

If the discussion is at all fruitful it may attain to that most desirable condition of things resulting in uniformity of the law relating to the user of the air in every country instead of each nation, as is the case in all other matters, adopting a code of its own, to the confusion of the nationals of one who may find themselves on or over the territory of another. In any case, the mere fact that the Admiralty, the Army Council, the Board of Trade, and the Home Office are being officially represented in Paris means that British officialdom is having the question of flight law brought prominently before its notice, and that the "waking up" of England in aeronautic and other matters is at last being boldly proclaimed to all whom it may concern.

The British delegates comprise: Rear-Admiral Sir Douglas Gamble, K.C.V.O.; Capt. Murray Sueter, R.N.; Lieut.-Col. G. M. W. Macdonogh, R.E.; Capt. A. J. G. Chalmers; Mr. W. Byrne, C.B.; and Mr. H. B. Butler, of the Home Office, who will act as secretary to the delegation.

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Manufacturing Prospects at Bury St. Edmunds.

CONSIDERING the rapidity with which the movement connected with the conquest of the air is progressing, it is hardly to be wondered at that many of the large and old-established engineering concerns in this country are considering the advisability of interesting themselves in it in a more or less direct manner. There are, for instance, not a few concerns like Messrs. Robert Boby, Ltd., of Bury St. Edmunds, who have very large establishments that are already suitably equipped for the work of aeroplane manufacture, and whose factories happen to be situated in the centre of extremely convenient trial-grounds that seem almost to have been made for the purpose. This particular firm, for instance, employs some 300 hands skilled in the working of light woodwork and similar construction, so that the men, in addition to the plant that is installed, could speedily be made to accommodate themselves to the service of the new industry. Considering that there are 21 acres of land surrounding the factory, and that one of the large buildings, being some hundred feet square, would give the needed accommodation, some readers of FLIGHT might find their requirements met if they were to take the matter up with the firm in question.

Catalogues wanted for India.

MESSRS. E. AND A. LEVETUS AND CO. of Stone House, 55 and 56, Basinghall Street, E.C., write that, on behalf of their aeroplaning friends in India, they would be pleased to receive catalogues of fittings for aeroplanes, such as turnbuckles, bracers, springs for chassis, wheels, &c., also of instruments, such as revolution counters, barometers, inclination indicators, anemometers, wind gauges, &c

AIRSHIP AND BALLOON NEWS.

The Willows Dirigible.

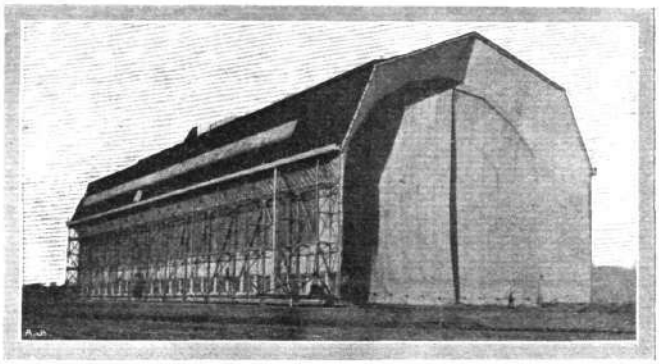
A LARGE shed is being erected at Dunstall Park, Wolverhampton, to accommodate the Willows dirigible which Mr. Willows intends shortly to take from Cardiff with the object of starting the manufacture of similar airships in the Midlands.

"Clement-Bayard II" Out Again.

TAKING advantage of a little calm weather on Sunday, M. Clement had his dirigible, "Clement-Bayard II," out at Lamotte-Breuil for about an hour and a half in the morning. No free flight was, however, attempted, the time being spent in stability and landing operations.

"Espana" has a Trial Trip.

HAVING reached Madrid at last, the Astra dirigible "Espana" made her first voyage with a Spanish military crew on May 5, when she made a trip from the Guadalajara Park, where she is housed, to Madrid, a distance of 57 kiloms. After manœuvring over the Palace of Puerta del Sol and the War Office, she returned to her starting place without mishap.



The new balloon shed for housing the Siemens-Schuckert dirigible.

Subsidising Airships in Germany.

A NOVEL scheme has been drawn up by the German War Office with the object of providing the nation with a large aerial fleet at a minimum expense. It provides that where private owners build airships which fulfil the military requirements and will undertake to place them at the Army's disposal in case of war and for the annual manœuvres, the Government will pay substantial subsidies.

Sequel to the German Airship Manœuvres.

IT transpires that misfortune still dogs the German Military authorities as a result of the aerial manœuvres at Homburg. The damage sustained by the "Gross" during the enforced deflation have proved to be very serious, and the repairs will take several weeks. Although the "Parseval" escaped serious damage, her commander, Lieut. Stelling, caught a very severe cold, and he is now lying seriously ill with pneumonia.

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THE POLYTECHNIC SCHOOL OF ENGINEERING— AERO ENGINEERING DEPARTMENT.

A LITTLE time back we published the aerodynamics examination questions for the Polytechnic students attending the course in aero engineering. We have now received from Mr. Robert W. Mitchell, the Director of Education, a list in order of merit of students who have been placed in the first class at the examinations in aerodynamics, petrol engines, and machinery, aero engine design and workshop practice in aeroplane work; also a list of prize winners.

It will be noticed that the silver medal of the Women's Aerial League has been awarded to Mr. R. Carline, as being the best student of the year in the aero engineering department, having obtained the highest aggregate marks in the group of subjects forming the course.

First-class certificates:—

Aerodynamics.—A. A. E. Ackermann, B.Sc., A.M.Inst., C.E., R. Carline, Malyshevitch Rokow, T. Ringwood, H. F. C. Burton.

Petrol Engines and Machinery.—*Honours, Part II.*—H. F. C. Burton.

Ordinary Stage—R. Carline, A. A. E. Ackermann.

Aero Engine Design.—R. Carline, H. F. C. Burton, S. V. Major.

Workshop Practice in Aeroplane Work.—W. Birchinger, F. C. Quine, Malyshevitch Rokow, K. C. Beath. Eighteen students entered this class.

Prize List.—The aggregate marks obtained by the students in the group of subjects forming the course in aero engineering have been taken into account in awarding the following prizes:—

R. Carline	Silver medal of the Women's Aerial League and Polytechnic bronze medal.
H. F. C. Burton ...	2nd prize.
*A. A. C. Ackermann	3rd prize.
Malyshevitch Rokow	Hon. mention.

In addition to the above, several students in each subject have been awarded Second Class certificates.

* This student was only able to attend part of the course.

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RUINART CROSS-CHANNEL PRIZE.

(FOUNDED DECEMBER 4th, 1906.)

IN view of the attempt to gain this prize this week-end by M. Jacques Lesseps, it is interesting to note the conditions under which the prize has to be contested. The following are the rules governing the event:—

1. This is an event instituted by Messrs. Ruinart and Son, and has for its object the flying of the Channel in a heavier-than-air machine propelled under its own power.

2. Closing date, December 31st, 1910, inclusive.

3. A prize of 12,500 francs will be awarded to the pilot who accomplishes the flight under the conditions of these rules on some Saturday or Sunday during 1910.

4. The event is open to all pilots without distinction of nationality.

5. A start may be made either from England or France.

6. The Aero Club of France has delegated the Commission d'Aviation to officially observe the event in France. To this committee are attached M. le Vicomte Andre Ruinart de Brimont and M. J. Max Le Roi representing Messrs. Ruinart and Sons, also Messrs. F. H. Butler, E. C. Bucknell and J. Lyons Sampson representing the Royal Aero Club.

7. The following conditions must be satisfied:—

a. The entrant must pay a fee of 100 francs, accompanied by a written notice of an attempt at least ten days prior to the intended event. This notice must be sent to the President of the Aero Club of France, who will inform Messrs. Ruinart and Sons, also the Royal Aero Club. Conformation of the notice must be sent four days prior to the intended event. The notice will be valid for nine consecutive days.

b. During this period of nine days the entrant may renew his notice for a further duration of seven days, to commence with the termination of the first period. This renewal must be accompanied by a further fee.

c. Should several entrants make an attempt on the same day, each must indicate his point of landing; the prize will then be awarded to whosoever lands nearest the indicated spot.

d. No descent may be made during the attempt.

e. Pilots holding the certificate of the Aero Club of France are alone eligible to compete.

8. The Aero Club of France accepts no responsibility in the event of accidents or damage.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Committee Meeting.

A MEETING of the Committee was held on Tuesday, the 10th inst., when there were present:—Mr. John Dunville, in the chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Col. J. E. Capper, C.B., R.E., Prof. A. K. Huntington, Mr. J. T. C. Moore-Brabazon, Mr. C. F. Pollock, Hon. C. S. Rolls, Mr. J. Lyons Sampson, Mr. Stanley Spooner, and Harold E. Perrin, secretary.

New Members.—The following new members were elected:—

Miss Gertrude Bacon.	Lieut. W. P. Mark-Wardlaw, R.N.
Clinton F. Chance.	H. E. Robson Roose.
Gordon Chapman.	Sir Marcus Samuel, Bart.
G. R. S. Darrock.	Dr. Purves Stewart.
Harry Fragson.	Philip Keston Turner.
Montague Grahame-White.	Baron Herbert von Pohl.
C. F. Ingram.	Marc J. Wolff.
V. Le Cren.	

The Royal Aero Club and the National Bereavement.

The Committee of the Royal Aero Club at its meeting on May 10th, the first meeting after the death of King Edward, passed the following resolution:—

> "The Committee of the Royal Aero Club desires to associate itself with the national grief at the loss of His Majesty King Edward, and tenders, on behalf of the Club, its heartfelt sympathy with King George and the Queen, and with the Queen-Mother and the other members of the Royal Family."

The resolution has been forwarded to King George V.

The late King Edward manifested his interest in aviation in many ways, and quite recently he attended the aviation meeting at Biarritz. By his conferment of the title "Royal" upon this Club he indicated his belief that the time had come for the official recognition of British aviation.

The following telegram has been received from the Egyptian Aero Club:—

> "The members of the Egyptian Aero Club beg their colleagues of the Royal Aero Club to accept the expression of their regret at the cruel blow that has befallen them in the death of their Sovereign."

Bournemouth Aviation Meeting.

Rules and Regulations.—The regulations and entry forms for the International Aviation Meeting at Bournemouth, to be held on the 11th to the 16th July next, will be ready in the course of the next few days. Applications for same should be made at the offices of the Bournemouth Aviation Meeting, 166, Piccadilly, London, W.

Hotel Accommodation.—Owing to the large number of applications for accommodation at the Hotel Burlington, only a few rooms are now available, and members desirous of securing same should make early application to the Secretary of the Club.

Wolverhampton Aviation Meeting.

The arrangements between the Royal Aero Club and the Midland Aero Club for the holding of an aviation meeting at Wolverhampton towards the end of June have been almost completed. The prize list will be about £3,500, and full particulars will be announced shortly.

Aviation Meeting at Newcastle.

The Northumberland Aero Club has applied to the Royal Aero Club for dates for an aviation meeting to be held at Newcastle, and negotiations are now in progress. Full details will be announced later.

Budapest Aviation Meeting.

The Hungarian Aero Club, who are organising the Budapest International Aviation Meeting on June 5th to 15th, 1910, have invited the Royal Aero Club to nominate a delegate to serve on the International Jury. The Prize List at the Budapest Meeting amounts to £24,000.

Doncaster Meeting.

The proposed aviation meeting at Doncaster, June 4th to the 11th, 1910, will not be held.

Flight Manual.

The attention of members is drawn to the publication of "Flight Manual," a reference book for the use of those engaged in aviation. The volume has been compiled and edited by Mr. A. E. Berriman, and can be obtained at the Offices of FLIGHT, 44, St. Martin's Lane, W.C., price 10*s.* 6*d.*

Baron de Forest £4,000 Prize.

Baron de Forest has offered through the Royal Aero Club of the United Kingdom a prize of £4,000, to be competed for under the following conditions:—

1. The winner to be the aviator who, from a point fixed upon by himself, and approved by the Royal Aero Club, flies the longest distance from England to the Continent, the distance to be measured from the starting point to the point of descent.
2. No part of the machine shall touch land or water during the flight.
3. The competition to be open from January 1st, 1910, until December 31st, 1910.
4. The flight must be accomplished by means of a machine of the type designated "heavier-than-air."
5. The complete machine, *i.e.*, the motor, planes, propellers, and all other parts thereof, must have been entirely constructed within the confines of the British Empire. This shall not be held to apply to raw material.
6. The entrant, who must be the person operating the machine, must be a British subject, and domiciled in Great Britain or the Colonies or dependencies thereof for a period of at least two years prior to January 1st, 1910.
7. The flight must be commenced in the presence of official observers appointed by the Royal Aero Club.
8. Formal notice of entry must be sent to the Secretary, Royal Aero Club, 166, Piccadilly, W., not less than one month before the proposed flight, and the entrant must comply with all the regulations as to notices, observations, and other details issued from time to time by the Royal Aero Club.
9. In every case, notification of the first attempt to be made, under these conditions, must reach the Royal Aero Club, 166, Piccadilly, W., not less than forty-eight hours prior to such attempt, and in the case of all subsequent attempts, not less than twenty-four hours' notification must be given.
10. The entrant must supply satisfactory evidence of previous flights before making any attempt under these conditions.
11. The competitor must supply satisfactory evidence of the exact point of descent, signed by two witnesses, whose signatures must be attested.
12. In accordance with the rules of the International Aeronautical Federation, the entrant must be a member of, or obtain a permit from, the Royal Aero Club of the United Kingdom.
13. Should any questions arise at any time after the date of entry as to whether a competitor has properly fulfilled the above conditions, or should any other question arise in relation to them, the decision of the Committee of the Royal Aero Club shall be final and without appeal.
14. Each competitor agrees to waive all claim for injury either to himself or his apparatus, and agrees to assume all liabilities for damage to third parties or their property, and to indemnify the Royal Aero Club against any such claims.

Eastchurch Flying Ground.

Railway Arrangements.—The following reduced fares have been arranged with the railway company for members visiting Eastchurch:—

1st Class return, 8*s.*; 2nd Class, 6*s.* 6*d.*; 3rd Class, 5*s.*

Tickets available for one month from date of issue.

Members desiring to avail themselves of these reduced fares are required to produce vouchers at the booking offices. Vouchers can be obtained from the Secretary of the Royal Aero Club. Trains leave Victoria, Holborn, or St. Paul's.

For the convenience of Members, the best train is the 9.45 a.m. from Victoria, arriving at Queenborough 10.55. At Queenborough change to the Sheppey Light Railway for Eastchurch, which is ½-mile from the flying ground.

HAROLD E. PERRIN,
166, Piccadilly. Secretary.

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

(NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.)

Aeronautical Society of G.B. (53, VICTORIA STREET, S.W.).

THE next minor meeting of the society will be held at the Society's offices on Thursday, May 26th, at 8.30 p.m.

The council has sanctioned the publication of a notice to inventors which will be found on p. 370.

Aviation Association of Ireland (HOTEL METROPOLE, DUBLIN).

A MEETING of the above Association was held on May 3rd at 8 o'clock in the Royal College of Science, with Mr. J. B. Dunlop in the chair. Mr. F. F. C. Trench read a paper on "The Stability of an Aeroplane," and dealt with the existing methods, and showed some original means for obtaining stability. Although he favoured automatic stability he said that it should not be such as to interfere with ease of hand control. Prof. Lilly proposed a vote of thanks, and opened the discussion, the following members taking part in it :—Messrs. Porte, Hutton, Wilson, Gill. The author in his reply showed a great knowledge of the subject, and was well able to meet his critics on all points.

The Secretary then announced that the next meeting would be held on May 24th, when Mr. H. J. Ferguson, the well-known Irish aviator, would read a paper on "The Construction and Flying of an Aeroplane." Also that a model competition would be held early in June.

The meeting then came to a close.

Birmingham Aero Club (165, HAMPTON STREET).

THE aero models exhibition fixed for May 20th and 21st has been postponed for a fortnight owing to the death of His Majesty the late King. The date of the exhibition is now June 10th and 11th.

Conisborough and District Model Aeroplane Society.

UNDER the above title a number of young enthusiastic people in the neighbourhood of Conisborough have handed themselves together for mutual help and assistance, and at a meeting held at the Old Hall, Conisborough, on the 3rd inst., a committee and officers were elected, and various rules drawn up. A model competition was also arranged to take place towards the end of June, and several entries have been promised.

Kite and Model Aeroplane Assoc. (27, VICTORY RD., WIMBLEDON)

THE meeting which was to have been held at Wimbledon on Saturday last was postponed in consequence of the death of His Majesty King Edward. A new date will be arranged by the Council, and announced as soon as possible.

Manchester Aero Club (9, ALBERT SQUARE, MANCHESTER).

ABOUT forty members of the club recently paid a visit to the aeroplane factory of Messrs. A. V. Roe and Co. Besides being interested in an aeroplane which was nearing completion, there were many details of construction to examine, from the cutting out of a propeller to the building up of an aeroplane wheel. They were pleased to find that Manchester was by no means behind on the point of quality and workmanship, combined with correct design.

Midland Aero Club (GRAND HOTEL, BIRMINGHAM).

AT a meeting of the Council the secretary reported that £4,000 had been promised towards the £5,000 required for the Midland Aviation Syndicate, and that the amount was rapidly increasing.

The chairman announced that the club hangars at Dunstall Park would be completed in a few days, and flying trials would commence almost at once.

Seventeen new members were elected to the club, including the Mayor of Wolverhampton, Dr. Councillor Grout, Alderman G. Adams, and Councillor Myatt.

The Council wish it to be known that the present is a very good opportunity for intending members to send in their applications, as members of the club will have the privilege of entrée to the whole of the aviation meeting at Wolverhampton.

Sheffield and District Aero Club (36, COLVER ROAD).

A GENERAL meeting was held on Wednesday evening, the 4th inst., Mr. F. V. Kavanagh in the chair, when the chief business of the evening consisted of making final arrangements for the Sheffield Sports Tournament (model competitions) on Whit Monday.

For obvious reasons the sports committee found it necessary to curtail the events originally drawn up, and in consequence the events to be decided will only be open to club members. Notwithstanding this, some 40 entries have been received from club members, and some large and practical models will be flown, including several petrol-driven machines, one of which is a one-third size cross-Channel type correctly modelled to scale. The club makes excellent progress, and it is hoped the competitions will add a further stimulus to the movement in Sheffield, and thus swell the ranks of the club.

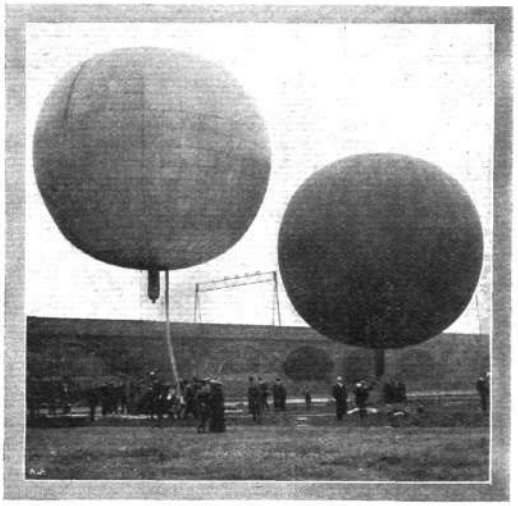
S.W. Aeronautical Soc. (51, ST. LEONARD'S ROAD, EAST SHEEN).

THE model competition of this Society was held at Wembley Park on the 30th ult. The prize was won by Chas. Descutter, whose model flew for 20 secs. C. J. Glanville showed a model (not for competition) fitted with a Cochrane propeller and a gyroscope, which worked beautifully. Mr. Cochrane himself showed a model, which unfortunately collided with a telegraph pole, and was damaged, but when repaired it flew admirably. The engine for the club monoplane is now well in progress. Several members visited the works at 4 p.m. on Sunday last, and inspected the monoplane before proceeding to the Ship Hotel, where the general meeting was held at 6 p.m. The Secretary, Mr. A. J. Fransella, is away on holiday, so letters that require immediate attention should be sent to the acting Hon. Sec., J. Furley Smith, 80, Clarendon Road, Putney, S.W.

Yorkshire Aero Club (63, ALBION STREET, LEEDS).

AT the meeting of the club on May 5th, at the Hotel Metropole, Leeds, Mr. Horace Walker, M.A., gave an address on "Aero Clubs and How Best to Promote Flying."

One of Mr. Walker's chief suggestions was for the formation of a small inner council of inventors and capitalists—with a paid agent sitting as consultant only—in order to bring both parties into mutual co-operation and to create confidence. Such a council would be able to give an opinion to the originator of any new idea as to whether it was advisable to proceed with the invention, and might be disposed to take it up for the club. If they did not approve, the inventor might still proceed at his own risk. In return for their services, if they took up the invention, the club should receive a percentage on the profits of sales. Capitalists getting the advice of the club would, said Mr. Walker, have more confidence in investing their money, and inventors would be encouraged by the fact that the council were there to see fair play. Besides securing an additional income the club, by combining several of the best ideas, might bring out a novel and successful machine of their own.



BOY SCOUTS AND BALLOON DESPATCHES.—The balloon "Continental No. 1," which was piloted by Major Baden-Powell, awaiting its despatch on its journey of "reconnaissance" in connection with the tests organised and carried out by the Aerial League, referred to in our issue of May 7th, page 357.

BRITISH MEETINGS AND NOTES OF THE WEEK.

Lanark Flying Meeting.

THE work of organising this flying meeting to be held at Lanark from August 6th to 13th is progressing very satisfactorily, and the guarantee fund is steadily mounting up, over £12,000 having been received already. The competitions will comprise long-distance flights, speed trials, weight carrying competitions, competitions for altitude, competitions for starting and alighting, &c., for which the amount set apart for prize money is £8,000, to be allocated over the various international events.

In all probability there will be other special prizes, particulars of which will be announced later. Lanark Moor and Racecourse, which are to be used for the meeting, is within one mile of the town, and also is a convenient centre for all parts of Scotland.

The Midland Flying Meeting.

A SPECIAL point in connection with the Midland Flying Meeting to be held at Dunstall Park Racecourse from June 27th to July 2nd, is that the main idea is to make it an all-British meeting for British flyers. To that end several of the events will be confined to Britishers. At a public meeting held in Birmingham on Wednesday of last week, it was announced that £2,700 had been subscribed in Wolverhampton towards the £5,000 necessary to cover expenses, and an appeal was made for the remainder. About £500 was promised in the room, and the Lord Mayor of Birmingham, who presided, said that was sufficient to warrant the committee going on. Mr. Ivy Rogers, the secretary, said he anticipated about 300,000 people would visit the meeting.

The Lancashire Meetings.

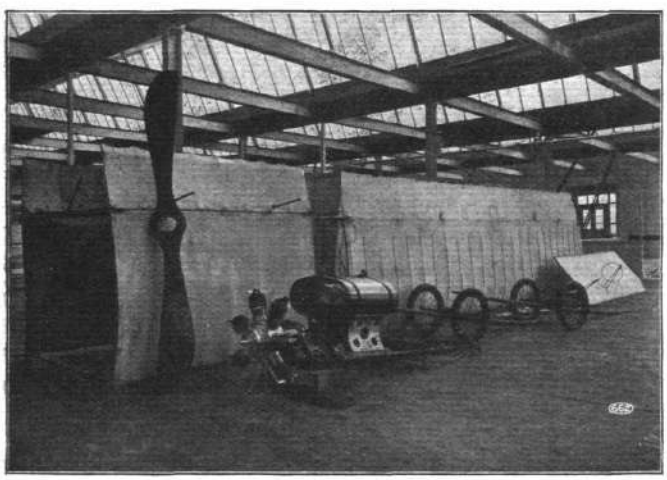
AT an executive committee meeting of the Lancashire Aero Club held at Blackpool last week it was provisionally decided that the first Lancashire Meeting should be held at Southport from July 28th to August 3rd, while the *locale* for the second will be Aintree, and the date from August 15th to 20th. One of the members, Mr. H. S. Higginbotham, has offered to equip the flying ground at Southport.

A Flying Week in Northumberland.

AT a meeting of the Northumberland Aero Club, held in Newcastle last week, it was decided to organise a four days' flying meeting, to be held on the club's grounds, at Boldon, during the third week in June. A guarantee fund of £1,500 to £2,000 is being asked for.

Doncaster Meeting Off.

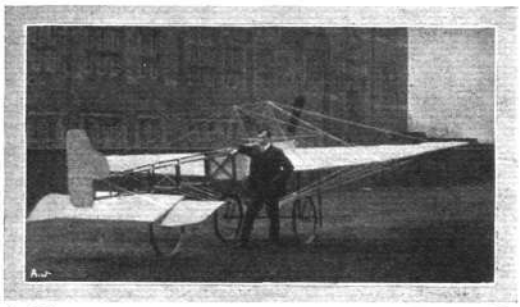
IT is officially notified by the Royal Aero Club that the proposed aviation meeting at Doncaster in June will not be held.



Paulhan's biplane dismantled at the Manchester works of Hans Renold, Ltd., and ready for its return to France, after the completion of the London to Manchester flight. This shows clearly the unit system of construction utilised by Mr. Henry Farman in his machines.

Aviation at Huntingdon.

MR. T. COXEN, Mayor of Huntingdon, writes us under date May 4th as follows:—"In order to avoid possible disappointment, will you kindly announce that up to the present time no arrangements have been concluded for an aviation meeting at Huntingdon for Whitsuntide."



A Blériot type machine just completed by Messrs. Hill and Co., of Bury, Lancashire.

Developments at Salisbury Plain.

LARKHILL CAMP, on Salisbury Plain, just by Stonehenge, promises to become a flying colony similar to that at Mourmelon. It is practically certain that it will be the training ground of our military aviators when they get to work, while others who have applied for sites there are the British and Colonial Aeroplane Co. and the Blair Atholl Aeroplane Co.

Accidents at Huntingdon.

WHILE practising with his monoplane at Huntingdon on Tuesday of last week, Capt. Dawes met with a mishap. He was flying at a height of 20 ft. when one of the planes snapped, and the machine fell with a crash, the propeller and front of the machine being smashed. Capt. Dawes escaped unhurt. Last Tuesday Mr. Radley was rising in gradually ascending circles, preparatory to making a cross-country flight to Cambridge on his Blériot monoplane, when something went wrong with the machine and it suddenly swooped down to earth from a height of 40 ft. Fortunately Mr. Radley was uninjured in the fall, but the machine was badly broken in front. The main planes, however, and the rear part of the machine were but slightly damaged.

A Correction.

BY a slip in the title to a photograph which appeared in our issue of April 30th it was made to represent Mr. Stuart Ogilvie flying at Camber, whereas, of course, the flyer in question was Mr. Alec. Ogilvie, who has made many good flights on his British-built Wright machine over the sands there.

Flying Men at Madame Tussaud's.

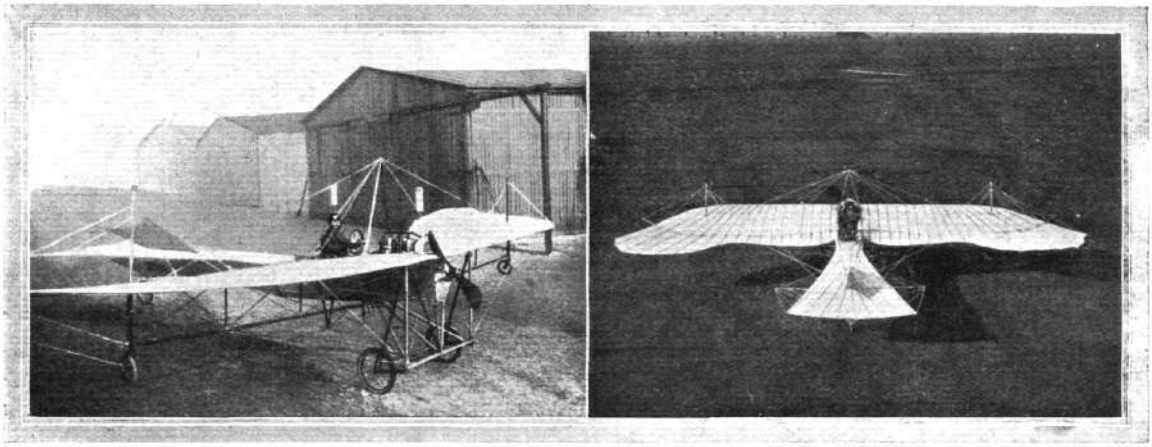
WITH the gradual accumulation of portrait models of famous flying men, Madame Tussaud's will soon boast a flying gallery. For some time life-like effigies of Count Zeppelin, M. Blériot, Mr. Latham, and Mr. Cody have been on view, and shortly they will be joined by models of Mr. Grahame-White and M. Paulhan, together with a model of the Farman biplane.

Parts for Aeroplanes.

MANY prospective flyers who are building their own machines are realising that it is a lengthy matter, and we hear that several are securing the parts which they have not yet been able to finish from Messrs. A. V. Roe and Co., Brownsfield Mills, Manchester. In this way thay are enabled to expedite the task of completing their aeroplane or glider with a minimum of trouble.

FLIGHT

Foreign Aviation News.



Igo Etrich's monoplane, "Taube," with which he has been flying at the Steinfeld, Wiener-Neustadt. View from the front and from above.

Encouragement in France.

M. Millerand, the French Minister of Public Works, has announced that he intends to follow the good example of his predecessor, and hopes to induce the Senate to vote a second credit of 100,000 francs for prizes to encourage aviation in France.

More Ae.C.F. Pilots.

Twelve more flyers were granted pilote-aviateur's certificates at the last meeting of the Aviation Committee of the Aero Club of France. The names of the recipients were :—MM. Gaubert, Rigal, Jullerof, Cheuret, Lieut. Féquant, Barrier, Lieut. Sido, Sallenave, Bruneau de Laborie, Lieut. Aquaviva, Count Montigny, Hayden Sands.

Doings at Mourmelon.

The Farman School.—On the 3rd inst., Mr. Henry Farman made several flights with passengers, among his companions during these trips being Princess Gramatchinoff, and Mmes. Branger and Koloninine. Lieut. Féquant was also in the air several times with a passenger, and flew over the surrounding country, his cumulative time being about an hour and a half. M. Bruneau de Laborie made the necessary flight for his pilot's certificate, and flew for half an hour. On the next day, Lieut. Sidot flew for half an hour, while eight of the military pupils made trips of varying duration, and the Chevalier de Laminne for about an hour at a height of 140 metres. On Saturday, Henry Farman flew for some time on Kinet's new machine, while the Chevalier de Laminne was aloft for one hour five minutes. During the past week good progress has been made by the lady pupils, Mme. Franck and Mme. Aboukäia.

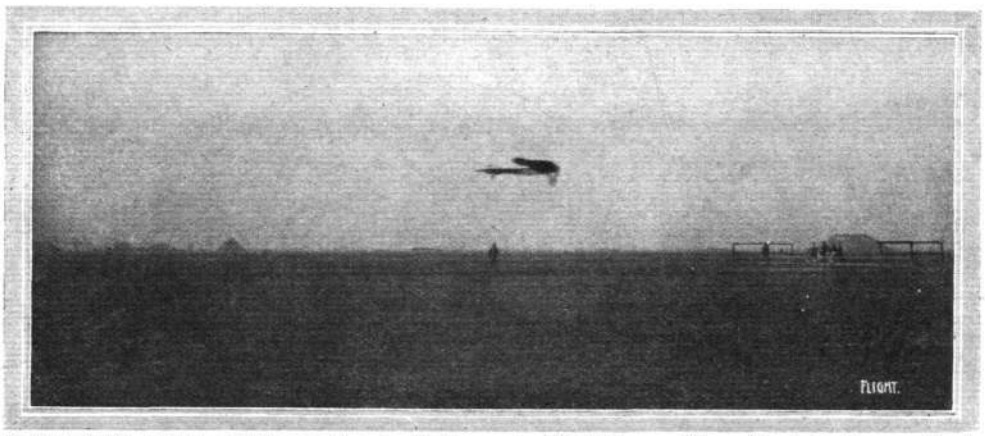
The Antoinette School.—Labouchere, on his new Antoinette monoplane, flew for ten minutes, at a height of 30 metres, on the 3rd inst., and on Monday, Wachter for an hour and a half, his average altitude being 60 metres. He was only stopped by the gathering darkness.

The Blériot School.—Mme. Jean Herveu has made good progress during the past week, while others who have been out on their machines on various days were Hubert Ehrmann and Dufour.

The Voisin School.—Several pupils of the Voisin school have been practising under M. Colliex on the school machine, which has been practically rebuilt. On Monday Ernest Paul, at his second attempt, flew for 15 minutes, while Pizzagali, de Laval, Riviere, Leitch and Assaky each made several circuits of the ground.

R.E.P. Flyers at Buc.

On the 5th inst. Pierre Madie, on one of the new R.E.P. monoplanes, fitted with a 60-h.p. motor, made several satisfactory



Herr Igo Etrich, on his special monoplane, in flight over the Steinfeld, near Wiener-Neustadt, about an hour's train journey from Vienna.

trial trips, and then started off on a long flight which was only completed after 40 kiloms. had been covered, while on Sunday last he took advantage of a lull between two storms, and flew for 10 kiloms., landing from a good height *en vol plane.*

Practice at Juvisy.

HAVING temporarily abandoned his monoplane M. Jean Dufour was flying on a Voisin biplane at Juvisy on Monday, and eight times he covered the complete course. Ladougne also made one or two good flights on the Goupy biplane, once or twice reaching a height of 150 metres.

Wagner Flying at Rheims.

MOUNTED on a Hanriot monoplane, Wagner flew for 26 mins. at Rheims on the 5th inst., and afterwards he carried M. Chassagne as a passenger for a distance of 12 kiloms.

M. Blériot at Pau.

ONE or two Blériot pupils still continue to practise at Pau, and on the 7th M. Blériot and M. Leblanc returned there in order to test their new two-seated monoplane. M. Blériot made a short trip with a passenger, passing over the Wright aerodrome. For the following day M. Blériot was himself a passenger on the machine, M. Leblanc being in charge of the levers during a cross-country trip which lasted 25 mins.

Rene Thomas an Aviator.

OUR motor cycling readers will remember that, owing to an accident in a race at Canning Town track, Rene Thomas was forced to give up motor cycle racing, in which he had hitherto been so successful. Last year, however, he made a welcome reappearance at the wheel of a little racing voiturette, and now we hear that he is to become an aviator. He has been engaged by the Antoinette Co., and is at present taking lessons from Wachter and Kuller, the instructors at the Antoinette school at Chalons.

Prize for Lady Flyers.

WITH a view to encouraging the fair sex to take up flying, M. Pierre Laffitte has offered a cup, value 2,000 francs (£80), for the lady who, at the end of this year, shall have made the longest flight. The prize is to be called the Coupe Femina, and no special entry will be necessary, but all records submitted must be duly authenticated.

Flying Round Strasburg Cathedral.

ONE of the most successful manipulators of the Antoinette monoplane, other than Latham, has been Herr Wienezziers, a young Silesian, who surprised the people of Strasburg on Tuesday of last week by circling round their Cathedral spire. Starting from the drill-grounds of the garrison, about 7 o'clock in the evening, he flew over the city and doubled the spire twice before returning to his starting place, a little over two miles out of the city. During the flight a height of 650 ft. was attained.

Wright School of Flyers.

ACCORDING to a despatch from New York, the Wright Brothers are now training some thirty young men at their flying ground, which is about 300 acres in extent, at Montgomery, Alabama. When they are proficient, these new aviators will be sent round the country to give exhibition flights, and thus influence orders for Wright flyers. These will then be built in the big factory which is being put up at Dayton, and to be in full swing at the end of June.

Mich in "L'Auto."

"Oiseau du Far-West: Vautour Jaune, la Terreur des Airs."
—How the French see Mr. Wilbur Wright in connection with the Wright-Paulhan patents action.

⊛ ⊛ ⊛ ⊛

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents asking questions relating to articles which they have read in FLIGHT, would much facilitate our work of reference by giving the number of the letter.

NOTE.—*Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.*

QUESTIONS ON BUILDING A GLIDER.

[506] I intend building a man-lifting glider (biplane) with main planes 20 ft. long.

I wish to keep expenses down, and should like the advice of some of your readers who have built gliders which have been successful.

1. What material is suitable for the construction of framework, taking weight, strength and cost into consideration?
2. Cheap and suitable covering fabric?
3. Where the above materials can be obtained?

Leeds. P. G. ROBINSON.

SOARING FLIGHT.

[507] I have noticed some large birds—rooks and seagulls—which after the few strokes of their wings necessary to raise them off the ground, move through the air for as far as a quarter of a mile in a level, or even slightly rising plane, in all directions, and occasionally circling, with only enough movement of their wings to preserve their stability; moreover they always do it on days when the wind is imperceptible; on rough days they take advantage of rising currents on the sides of hills, in the manner of Mr. Wilbur Wright's birds. Could you kindly explain the phenomenon, which seems contrary to all laws?

Thanking you for the immense amount of interesting and valuable matter published in your most useful paper.

S. W. MAXWELL.

[Our correspondent refers to the phenomenon of soaring flight, which can only take place in wind having an upward trend or a variable velocity. It may be said with truth that dead calm is an atmospheric state unknown in nature, and all experiments that have ever been made have shown winds to be variable in velocity. Authentic records exist of cases in which atmospheric conditions at first thought to be calm have in reality represented up currents of sufficient strength for soaring flight. The causes of such up currents are numerous. Inland, the heating of the ground under the sun's rays is sufficient to produce a strong enough current in some climates. The theory of soaring flight in winds of variable velocity is rather complicated, but in the case of simple up currents or winds having an upward trend the explanation of soaring flight is simple. Flight is relative to the wind in which it takes place, and where, in absolutely still air, the bird would glide

towards the earth, in a wind of upward trend it can glide horizontally, because the rising trend of the wind takes the place of the falling on the part of the bird. The bird falls through the air just the same in both cases; but whereas in still air the bird will ultimately come to earth, in an up current the bird can glide on indefinitely, and may even gain in altitude. It is necessary to the condition of soaring flight that the upward slope of the wind should be at least equal to the natural gliding angle of the bird, otherwise the bird will surely come to earth, although its glide may be prolonged.—ED.]

CONTROL GEAR.

[508] I am sending you two diagrams, together with the description, of a control to be fitted to aeroplanes, which may be of interest to some of your readers.

In this control there are two steering-wheels, a large one, B, and a small one, A. B is connected to the outer shaft of the steering-wheel column, while A is connected to the inner shaft, which terminates in the toothed-wheel F. The bevel-gear is operated by the wheel B working the inner shaft at D. E is a rack which is turned by A, through the toothed-wheel F, and is connected to the outer shaft at D. We will first consider the movement of the wheel B only. Suppose B is turned, then the inner shaft at D will turn; this is connected, to work the vertical rudder for horizontal steering. If, however, the wheel B, instead of being held firmly and turned, is just spun round, the whole steering-column will swing into a position as shown by the dotted lines in Fig. 2, the shaft D remaining stationary, and so not affecting the vertical rudder.

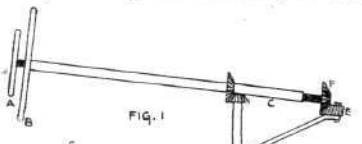
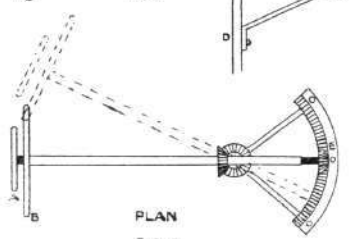


FIG. 1



PLAN

FIG. 2

By this a motion similar to that of the tiller of a yacht occurs at C. This movement is for working the ailerons for lateral stability. In this way lateral stability and horizontal steering are both effected by the one wheel, B. If a combined action of ailerons and vertical rudder is required, all the operator has to do is to hold the wheel, B, and push it bodily over to right or left, when it will be seen from the diagram, Fig. 2, that a simultaneous action of vertical rudder and ailerons will take place.

A, the smaller of the two steering-wheels, is intended to be used chiefly for operating the elevator, the toothed-wheel, F, moving the rack, E, which is connected through the outer shaft at D to the elevator. If, however, it is desired to manipulate the ailerons through A, spinning it round will have just the same effect as in the case of B, moving the steering-column over, as shown by dotted lines. Also, holding A firmly, and moving it sideways, will have the effect of combining the movements of the ailerons and elevator.

Cleckheaton. G. B. SYKES.

GLIDING DESIGN AND A GLIDING GROUND WANTED.

[509] I take the earliest opportunity of thanking Mr. W. H. Vaughan for his kind letter of advice. I did, as a matter of fact, have a try at building the glider before you were able to publish my letter. I do not mind admitting that it was unsuccessful. I never finished it, but it gave me much valuable experience, of sorts. I found that it was difficult to join my ribs up to the bamboo without unduly weakening the latter, and at the same time to make a firm job. Also that my leading and trailing edges were too weak without some support. I must admit that I have a sort of instinctive longing for a tail and elevator, as I rather think a tail gives stability, though I am not sure. As soon as I can I propose to start a new machine on the lines suggested by Mr. Vaughan, which I hope will be more successful. I live at Weybridge, and though I shall be away till September I hope then to be able to accept Mr. Vaughan's kind offer of showing me his machine. I should be immensely obliged if he could tell me of any good gliding ground within 20 miles or so of Weybridge. I thought of trying on some of the hills near Sunningdale, but I do not known whether one would be allowed to do so.

Windsor. W. WHATELY SMITH.

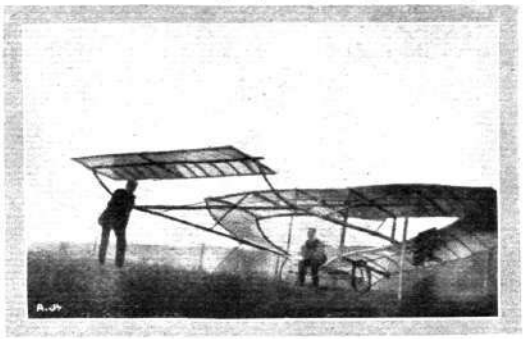
OF INTEREST TO HASTINGS AND DISTRICT RESIDENTS.

[510] Will you allow me through the medium of your valuable paper to ask anyone interested in Hastings district, that is to say Hastings, Bexhill, Battle, Rye, &c., to communicate with me with the idea of forming a "Model Aero Club," to advance, as far as possible, the art of flying in this district, which has splendid surrounding country for that purpose, and to meet and to have model competitions, &c., and read papers of interest on the subject. We have Mr. Ogilvie flying at Rye, and Mr. Du Cros (the secretary of the Parliamentary Aerial Defence Committee) both local men who would, I am sure, give their help and support in this matter, and would do a great deal towards getting a flying week in the district.

60, Cambridge Road, Hastings. H. W. WILLIS.

ANOTHER GLIDER.

[511] I enclose a photo of my glider, which I think you might care to put in your valuable paper. It is a biplane, built to my own designs, and of somewhat original shape. Note the boat-like shape of the lower plane; this gives it perfect automatic lateral stability even in a strong wind. I finished it a day before I sailed to South Africa, so was unable to give it a fair trial, but it made a very successful short glide in Wimbledon Park, with a fairly strong side wind. The machine kept a perfectly steady keel throughout,



and my model does not object to even a strong wind. The photo, I'm afraid, is a bad one, taken in a rapidly failing light, with a four minutes' exposure. My mechanic is seen sitting in it.

I give a few dimensions:—

Span of main planes ...	22½ ft.	Total lifting surface	about 285 sq. ft.
Width of same	6½ ft.		
Length of elevating planes	13 ft.	Weight	150 lbs.

The whole frame is constructed of ash, except the elevating planes, which are of bamboo. It is mounted on strong bike wheels.

Patents are being taken out for this invention.

The Karroo, Cape Colony. CEDRIC BOUSTEAD.

MODELS.

HEAVY MODEL MONOPLANE.

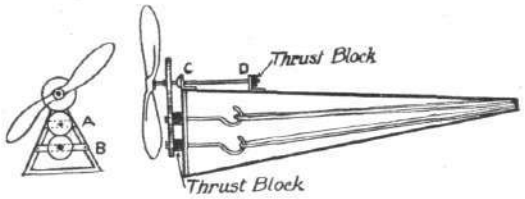
[512] In your issue of April 23, Mr. Benson (172) in answer to Mr. Mackay's question as to the greatest possible weight for a model monoplane of 1½ sq. ft. refers to one of my small models as carrying 6·8 ozs. per sq. ft. It may interest him to know also that my larger models of about 1¼ sq. ft. weigh 1¼ lbs., and from Mr. Broughton of Brighton I learn that one of his pupils has had flights of 300 yds. with one of these carrying 6 ozs. of lead, which gives a load of very nearly 21 ozs. per sq. ft.

Kingston-on-Thames. T. W. K. CLARKE.

CLOCKWORK *V.* ELASTIC.

[513] In reply to Mr. Irvine Hoyle (440), I can assure him that, for a Santos-Dumont monoplane, clockwork is entirely out of the question. He will find a geared elastic motor, in turn geared down to the propeller very efficient. I did not make an exact model, but it was near enough. Two brass plates, A, B, are taken

and screwed across the frame (as shown in the sketch) 1 in. apart. Then two gear wheels 1 in. in diameter are fitted with six hooks to take the rubber thrust-blocks. To the top member of the frame



are attached two pieces of brass, C and D, bored to take the propeller-shaft which carries the gear-wheel, which in size must equal twice the distance from the motor-gear to the bearing. In my machine it was 2 ft. The propeller-shaft carries a thrust-block as shown.

W. Didsbury. CLYDE

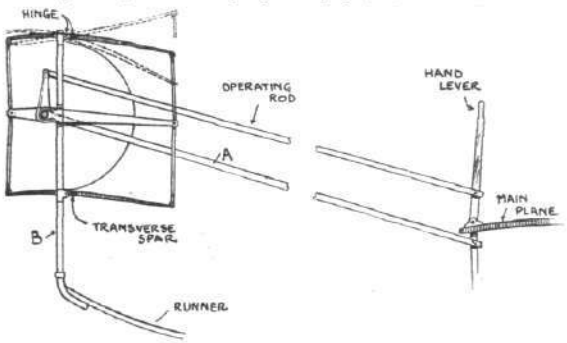
WRIGHT MODELS.

[514]. I am about to make a scale model of the Wright aeroplane. Could you or some of the readers of FLIGHT answer me the following questions *re* that machine:—

In the scale drawings of the machine in the issue of FLIGHT for March 12th, there is a strut of wood (marked A in the accompanying drawing). (1) What is this strut for? (2) How is it fastened to the elevator? because the other end is fixed to a portion of the chassis. If this strut is fastened to the upright strut, B, I cannot see how the elevator can move.

Ramsgate. LINDSAY THOMPSON.

[The accompanying sketch should make the construction and action of the Wright elevator quite clear. The strut, A, is a strengthening member coupling the upright, B, to the frame of the



machine. It lies approximately parallel to the runner upon which the machine is mounted. The elevator is operated by a rock-shaft carried in brackets that jut out from the upright, B, which supports the planes of the elevator direct. It is this displacement of the axis of the rock-shaft from the axes of the planes that causes the planes to flex when the operating-rod is moved to and fro.—ED.]

IMPORTS AND EXPORTS, 1910.

Aeroplanes, airships, balloons and parts thereof (not shown separately before 1910).

Imports.	£	Exports.	£	Re-Exportation.	£
January ...	2,516	January ...	750	January ...	550
February ...	437	February ...	2,950	February ...	—
March ...	7,516	March ...	128	March ...	600
April ...	6,305	April ...	950	April ...	1,470
4 months ...	16,774	4 months ...	4,778	4 months ...	2,620

Aeronautical Patents Published.

Applied for in 1909
Published May 12th, 1910.

9,303. J. BODE. Aeroplane.
9,616. H. and C. E. A. HARTRIDGE. Aeroplanes.
12,446. L. B. DE LAITTE. Apparatus for aerial navigation.
12,536. C. R. AND W. R. GREEN. Aerial propeller.
12,846. W. COCHRANE. Propeller for flying machines.
12,856. J. KNÖPP. Dirigible airship.
20,145. R. STREHLAU. Apparatus for imparting upward and forward motive impulses to aerial machines.
22,203. S. B. MINNICH. Flying machines.

DIARY OF FORTHCOMING EVENTS.

British Events.

1910.
May 28 Balloon Race, Hurlingham.
June 4 Kite and Glider Contests. Kite and Model Aeroplane Assoc.
June 25-July 2 Wolverhampton.
July 2 Balloon Race, Hurlingham.
July 11-17 Bournemouth.*
July 16 Kite and Models Competition. Kite and Model Aeroplane Assoc.
July 23 Balloon Race, Hurlingham.
July 28-Aug. 3 Southport.
Aug. 6-13 Lanark.*
Aug. 15-20 Aintree.

Foreign Events.

1910.
May 10-16 Berlin.
May 14-22 Lyons.
May 15-22 St Petersburg
May 17 Pal-rmo.
May 20-30 Verona.
June 5-12 Vichy.
June 5-15 Budapest.
June 26-July 10 Rheims.*
July 24-Aug. 10 Belgium.
Aug. 25-Sept. 4 Deauville.
Sept. 8-18 Bordeaux.
Sept. 24-Oct. 3 Milan.
Oct. 18-25 St. Louis. Gordon-Bennett Balloon Race.
Oct. 25-Nov. 2 America. Gordon-Bennett Aeroplane Race.

* International.

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